What's Happened To Our High Schools?

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INTRODUCTION

Historians will undoubtedly characterize the period between October 4 and November 4, 1957, as the prelude to a real educational awakening on the part of the American people. On the first of these two dates, as everybody knows, the Russians launched Sputnik I. On the second, they sent Laika on her epochal oneway flight in Sputnik II.

While these dramatic events were still on the front page, the United States Office of Education, by a rather fortuitous and ironical coincidence, published its controversial study, *Education in the USSR*. Aroused and alarmed by what seemed to be the obvious relationship between Russia's scientific achievements and her system of education, we immediately intensified the probe of our own system. This probe had been in progress intermittently in the twelve years following the end of World War II, but it lacked that sense of urgency that the Sputniks provided.

Overnight we began to ask ourselves and our leaders what had happened to our self-acknowledged superiority in science and technology. Didn't a larger proportion of our boys and girls attend high school, finish, and go on to college than anywhere else in the world? Weren't our graduate schools the best in the world? Didn't we lead the entire world in production of Ph.D.s? Why then hadn't we been the first to put an orbiting satellite into space? Had our system of public and private education somehow failed?

The last question summed up all the rest. It cut deepest and hurt the most because all of a sudden we knew the answer: *We, the American people, have failed in our educational responsibilities. We have failed ourselves, but worse than that, we have failed our children.*

How have we failed ourselves and our children?

Not simply by our failure to provide enough competent teachers. Not simply by our failure to provide better facilities and more space. Not simply by our failure to educate properly the most gifted.

These failures are tragic enough. But *we have compounded the tragedy by our failure to realize the importance of the curriculum in secondary education, and by our failure to sense the vital connection between education and national security.*

As these words are being written there is little doubt that the American people are grimly conscious of some hard educational facts:

ABOUT THE AUTHOR

By 1929, when he received the Ph.D. in Classics from Yale at the age of 26, John Francis Latimer had been a public high school teacher of Latin and coach for one year, principal-superintendent for one year and an Instructor at Vanderbilt University for another. After his graduate studies at Yale he taught successively at the Taft School, Knox College, and Drury College. He is now Professor of Classics, Executive Officer of the Classics Department, and Assistant Dean of Faculties at The George Washington University.

Dr. Latimer is a member of the Managing Committee of the American School of Classical Studies in Athens, of the American Philological Association, the Archaeological Institute of America, the American Classical League, and of the Executive Committee of the Classical Association of the Atlantic States. He was president of this latter association from 1955 to 1957.

A naval officer during World War II, he served in the Atlantic and Pacific areas for two years and received four battle stars. At the present time he holds the rank of Captain in the U.S. Naval Reserve.

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we have fallen not simply far short of the Russians hut far short of our own capahilities and potentialities in the production of scientists and engineers.

Predictions and warnings of this have been appearing almost daily in the public press since 1950. As a people, however, we are pronc to postpone action until a crisis of some sort jars us from our lethargy.

A crisis of that sort bas indeed come upon us—as is plainly evident in the Seven-point Program recently presented to President Eisenhower by the Department of Health, Education, and Welfare. Wbether Congress will accept this program in whole or in part is not yet known, but of one thing we may be sure: Whether hy neglect or design, we bave made our public scbools what they are. *If we now think they are not what they should be, we should not blindly plan to change them until we know what they have been doing and how they came to be doing it.*

We do not naively suppose that scientists are horn and not made. If tbe Russians feed their elementary and high school students a diet beavy with mathematics and science and foreign languages, should we therefore do the same? What part should tbe humanities play in the education of a scientist? What part should science play in the education of nonscientists? If the Russians gear their educational methods and studies to the pace of the most gifted, is that the proper path for us? If tbey permit no electives, place the less gifted in less difficult studies, and send only the elite to college, are those the solutions to our probelms? Is a democracy capable of coping witb the dilemma of providing for tbe proper education of the many *and* the few ?

These are not easy questions to answer and most of tbem cannot he answered merely by tbe expenditure of more money. But answer them we must.

This study, hegun now some four years ago, attempts to present some fundamental facts about our educational system that will, it is hoped, help us to understand our educational problems more clearly. It centers mainly hut not exclusively on tbe high school curriculum. It traces the changes that have taken place in high school studies, primarily since 1890, and relates to those changes student enrollments in the various subjects. It covers the entire curriculum from 1889-90 through 1048-49 in six different years selected as nearly as possible at ten-year intervals. Data for foreign languages are continued through the fall of 1954; for the other cumulative subjects—mathematics and science—through the fall of 1956.

Does the choice of subjects in high school determine the choice of an undergraduate major in college? Do student enrollments in mathematics, science, and foreign languages have any relationship to each other? Do they vary widely among geographical regions? Have these variations themselves changed over the years? Have boys always outnumbered girls in the cumulative subjects? What geographical regions send the largest proportions of public high school graduates to college? Were the public high schools more nearly preparatory schools for college in the two decades before and after 1900 than they are today?

These are some of the questions this study attempts to answer.

The answers may or may not be pleasing; in many cases they are most certainly not final. For education, particularly secondary education, is inherently dynamic in a democratic society. As it changes, its quality always depends primarily on the quality of public concern. Our high school education was not *good before* and *bad after* the two Sputniks were put into orbit. Its quality did not magically change overnight. What *did* change was our *attitude* toward it. Our national security was not endangered by the two small spheres circling the earth or by the fact that the Russians put them there first. But it was and is endangered by our unwillingness to pay the mental and financial price necessary to develop and maintain a sound educational program at all levels of our educational house. The essential ingredients of that program must be science *and* the humanities, not science *or* the humanities.

We must face these facts realistically; to that end this study is dedicated. As it takes its place among the many that have been made of our schools, a word to the reader may be in order: Although there are many cross references, a deliberate effort was made to write each chapter as a separate and independent unit. A variety of statistical information, not covered in the text, or broken down in a different way, is contained in the Appendices. These data make it possible for the reader to draw his own conclusions, in agreement or disagreement with those suggested by the writer.

One final note: The use of facts and figures is not meant to imply that the *quality* of education can be measured by statistics. But by means of these facts and figures, cold and lifeless though they may seem, we may be able to take the educational pulse of America and to prescribe with confidence for her educational health in the years to come.

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Over the several years this study has been in preparation my debt to friends and associates has piled high. It is a pleasant sort of debt because it can never really be paid. But it can be acknowledged and this I gladly do.

Some of the creditors are mentioned in appropriate notes close, as it were, to the scenes of their contributions. *Gratias eis quam maximas ago.*

Of the others I would make special mention of several. Miss Rose Marie Smith, Specialist in Educational Statistics in the U.S. Office of Education, helped me find my weary way through the morass of numbers and kept me up to date with information and publications issued by the Office of Education. Dr. Kenneth E. Brown, Specialist for Mathematics, furnished some pre-publication data from his most recent pamphlet (No. 120) on science and mathematics, at a time when such help was most needed. Dr. Ray C. Maul, Assistant Director of the Research Division of the National Education Association, explained a few of the intricate problems connected with teacher supply and demand. None of these of course should be charged with what may seem, in the opinion of some, errors of fact or of interpretation.

I would mention also Dr. Mitchell Dreese, who was Dean of the College of General Studies of The George Washington University when work on this volume began, and Dr. Oswald S. Colclough, Dean of Faculties, under whom it was completed. The encouragement they gave by permitting flexibility in my administrative schedule was an important complement to the time thus gained.

Only three people in addition to the publisher read the complete type-script. Each of the other two read it *in cursu* and somehow managed to survive. As chief critic of style and content I owe much to Dr. Craig R. Thompson, professor of English at Lawrence College. He could not entirely recast the writing habits of a lifetime but what he saved the readers from they will never know.

My wife knows because she played an even larger part in their salvation. With her it has been a thrice-read tale—and more. No one knows better than she the long hours and hard work that writing entails. No one knows better than I the blessings of a sympathetic patience and an understanding ear.

J.F.L.

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CHAPTER I

THE RISE OF PUBLIC EDUCATION

Nothing in the history of education can compare with the rise and development of the American system of free public education. Nothing in that system reflects more clearly the influence of democracy than the gradual evolution of the public high school and the unique role it has come to play in our educational and national life.

In colonial times the principle of elementary education for all was early established. The Protestant church required of its members a reading knowledge of the English Bible; the colonial government required of all inhabitants a reading knowledge of its laws.[1] Personal salvation depended upon the one, civil obedience on the other. Thus each householder had a religious and civil duty, in the absence of a public system of education, to provide the members of his family with the training necessary for reading the commandments of God and the laws of man. The affairs of daily life also made it practical to include some instruction in writing and arithmetic.

Different communities varied so widely in their methods of providing elementary instruction in these three subjects that in New England some states passed regulatory laws and set up machinery for their enforcement. But the laws were neither widely obeyed nor strictly enforced. Public sentiment in time proved more effective. In the middle and southern colonies, where distances were greater and settlements less numerous, such matters were of local concern and initiative. In all the colonies teachers were difficult to obtain, and schools, whether taught by a local "dame" or by some "itinerant" pedagogue, were limited in number and poor in quality for many years. The wonder is that they existed at all, and that the arrangements, whatever they were, always included provisions for children and orphans of the poorer class.

On the secondary level education was much more restricted in purpose and scope. The primary purpose was to prepare youth for college and thus to maintain an educated class from which would come ministers, and teachers, and citizens fitted for leadership in legislative and judicial bodies. Outside of New England such education was also considered necessary to prepare members of the landed aristocracy for their roles as country gentlemen or squires. Particu-

larly in the South it had long been the custom to send young men to colleges in England, and often to the grammar schools there, in preparation for such a life. George Washington's older brother was among those so educated, and he himself had all but started when destiny intervened.

Although grammar schools began with what we call the fourth or fifth grade, for many years there was little connection between them and the elementary schools. Many seven-year-olds had to be given special home instruction by parents or tutors before they could enter the grammar school. The expense of such instruction and the cost of tuition served to restrict such education to a relatively small minority.

Another and even greater barrier to larger enrollments was the curriculum. Since the curriculum of the early colleges was primarily Latin and Greek, the grammar schools had no choice but to get their pupils ready for such studies, and the students had no choice but to accept such academic fare. Many of them could not see it through. Latin received the greater emphasis, and the extent to which it was studied can scarcely be realized today. The usual procedure in grammar school called for seven years of Latin and three or four years of Greek. The pupil spent the first two years in memorizing Latin forms, vocabulary, and grammar. Graded readers were then introduced and these were followed by standard Latin authors—Caesar, Cicero, and Vergil—and several usually read now in college, if they are read at all. Greek was studied less intensively and extensively. Since Latin was studied first, a certain knowledge of its grammar was assumed, and the early Greek grammars were often written in Latin. The Greek authors most read were Xenophon and Homer, but The New Testament in Greek with a Latin translation probably received the greatest attention.

Since the few colleges in existence required a speaking knowledge of Latin for entrance until about 1700, the grammar school also emphasized its oral use. So great was the emphasis on writing and speaking Latin that some parents complained that their children had difficulty in speaking and writing English. There was no formal study of English grammar. It was learned through the study of Latin and Greek. Latin writers served as models of elegant style for original compositions in Latin prose and poetry. Some knowledge of ancient history and life was gleaned from the Latin and Greek authors studied in class and perhaps from some outside reading assigned to students in advanced classes.

This was the type of secondary education that prevailed throughout

the colonies down to the Revolutionary War, and there is no douht that it did not appeal to many students whose parents were well ahle to pay tuition charges. By modern standards they were almost ridiculously low and not excessive even for the colonial period. Information is lacking ahout the numher of schools and their total enrollments. It is fairly certain that each town or community of any size had at least one grammar school of sorts and that the heaviest concentration was in New England.[3] Some of them hecame famous in their own day, and several in New England have maintained their reputation to the present time.

Although many of the early grammar schoolmasters were ministers, those with the greatest reputation were laymen and might even be called professionals. The most famous of these was Ezekiel Cheever. He hegan teaching in Quinnipiac, now New Haven, in 1638. Seventy years later he retired as headmaster of the renowned Boston Latin School, only a few months hefore his death. Not only did he set a record for teaching that has never yet been equalled, hut most of the prominent New Englanders of his day were his pupils, and a little Latin text he wrote was the first of its kind written and puhlished in America. In a funeral sermon delivered September 8, 1708, two weeks after Cheever's death, one of his former pupils, Cotton Mather, said of him that he was a teacher "than whom New England had known no hetter." Many of his students joined in paying similar trihutes.

Most of the teachers, however, were not comparahle to Cheever; the scarcity of good teachers was a perennial prohlem then as now.[4] One of the difficulties was inadequate salaries. In the course of his sermon Mather had a few things to say on the suhject that have a strangely modern tone, even in his pompous rhetoric:

"These our School-Masters, deserve a great Encouragement. We are not wise for our Children if we do not greatly encourage them. The PARTICULAR PERSONS, who have their children, in the Tutelage of Skillful and Careful School-Masters, ought to make them suitahle recompenses. Their Stipends are generally far short of their Deserts. They deserve Additional Compensations . . .

"To feed our Children, to Cloath our Children, To do anything for the Bodies of our Children; . . . we count no Expense too much; At the same time to have the minds of our Children Enriched with the most valuable Knowledge, . . . To What Purpose? is the cry: a little Expense, how heavily it goes off! My Brethren, such things ought not so to be."[5]

But they were; and the way of the schoolmaster, like that of the transgressor, has always been hard.

Teacher shortages, teacher salaries, and the curriculum—these three, but the curriculum was the greatest factor in the grammar school's decline. As population and wealth increased and social distinctions became less important, dissatisfaction with this type of education and its narrow curriculum became stronger and stronger. Not all students wanted to prepare for college. In place of so much Latin and Greek they hoped to substitute a few other courses that would be of more direct and immediate help in the shop and office or on the farm. But the curriculum had been fixed and theirs was not to reason why.

By 1700, however, another type of school beyond the elementary level had been set up in many of the larger towns and cities. They were privately conducted, and classes were generally held in the evening during the winter or summer months, and sometimes both, for the convenience of those who had daytime work. This arrangement also made it possible to use teachers who were employed full time during the day.

The schools were open to any who wished to attend, and many of the students were sent by masters to whom, under varying legal requirements, they had been apprenticed. It was the duty of the master to look after the spiritual welfare of his charges and to have them trained in some useful work. The apprentices, both boys and girls, with the proper training, could become largely self-supporting and thus no longer dependent on public or private bounty. The evening schools, accordingly, were primarily vocational or practical in nature, and taught such courses as advanced mathematics, geography, map-making, navigation, surveying, astronomy, English, and even foreign languages. For the girls there were additional courses in needlework, china painting, and quilt making.

Such schools undoubtedly added to the dissatisfaction with the grammar schools and their narrow curriculum. Many families had capable sons who had no desire to go to college or to concentrate on Latin and Greek for six or seven years. These parents wanted schools for their sons that were a little more "respectable" than the evening schools but which would offer some of the subjects taught in them. They tried to get the curriculum of the grammar school changed or expanded, but to no avail.

Such resistance to change led eventually to the downfall of the grammar schools. It was Benjamin Franklin, that father of so many

different things, who finally succeeded in breaking their monopoly. With other interested and wealthy Philadelphians he founded a private academy in 1751. It had separate masters for each of three different schools—mathematical, English, and Latin. The last had been included somewhat against Franklin's wish, but he yielded to those who wished preparation for college to be one of the functions of the academy. In 1754 a philosophical school was added in which such subjects as logic, rhetoric, natural and moral philosophy were taught to advanced students. In 1755 the academy was reorganized. The Latin and philosophical schools were designated as the college, the English and mathematical schools as the academy. The college was named the College of Philadelphia and became in time the University of Pennsylvania.

Although Franklin's academy did not meet all of his expectations and hopes, it did set in motion a pattern that changed the direction of secondary education in this country. The timing could not have been more propitious. By the Revolutionary War the idea had been widely accepted. The war checked but did not stop the movement, and two academies that later became nationally famous, Phillips Andover and Phillips Exeter, were actually founded while the war was in progress. The close of the war gave the movement renewed impetus. America had finally won educational as well as political and economic independence, and the time was ripe for the idea of education as a public responsibility.

The first definite formulation of the idea came from the fertile brain of Thomas Jefferson. In 1779 he proposed to the Virginia House of Delegates a plan to establish a system of free public education in that commonwealth. The plan was too advanced for the times—and too expensive; it was never put into operation. But undoubtedly it fired the imagination of national and educational leaders, and probably played a part in influencing national legislation that soon followed.

In 1787 the Continental Congress passed a law known as the Northwest Ordinance, which provided the administrative machinery for the government of that vast region and set forth the arrangements under which the new states to be formed from it would be admitted to the union. One provision set aside the sixteenth section in each township for the maintenance and support of schools. This laid the foundations for the creation of permanent school funds which eventually formed a part of each state budget. Two years later Massachusetts made its district school independent of town authorities, and other states passed similar laws which gave each district local control over

its own schools. In 1791 the adoption of the Tenth Amendment gave the states all powers not reserved to the federal government. This was interpreted as authorization for the states to establish state-controlled systems of education, and at varying intervals each state proceeded to put that principle into effect.

By 1800 the movement for state systems of education was underway, and primarily on the two levels of elementary and higher education. By 1850 the concept of state taxation to support such undertakings had been generally accepted. Although not all states had both types of education until after 1870, the need for public high schools to fill the gap between the elementary school and college became more and more apparent. Some public provision had to be made for those who wished to prepare for college, and for the larger number who wished to prepare for more practical pursuits. The private academies, however, were performing both functions so well that their very existence was at once a hindrance and a help in the movement to establish free education on the secondary level. The very excellence of their performance for a long time made it seem unwise to replace them. But they were not under public control, and as private institutions they charged tuition. In time these two facts worked against them and helped to pave the way for the public high schools, which were patterned after them.

The rapidity with which the academies had spread after the Revolutionary War was ample evidence of the educational needs they were meeting. Some adopted the idea of broad curricula advocated by Franklin. Some were strictly college preparatory; others were strictly vocational. Some admitted boys only, some girls only, some both. They provided many denominations with the answers to their educational problems and religious needs. Most of them were under private control and governed by self-perpetuating boards; all received charters, and in some cases, authority to grant degrees, from various state legislatures. With the exception of a few that were set up to provide educational facilities for the poor, all charged tuition. Many of them provided training for teachers in the public elementary schools. Since none had to be bound by tradition or college entrance requirements, they suited their courses of study to the wishes of local communities, and became in effect the community colleges of their day.

The influence of the private academies in our educational history was enormous. The educational opportunities they offered gave great impetus to the concept of free public high schools. They served as models in some respects for manual-labor schools, which were imported

from Europe and flourished briefly between 1800 and 1840, and for military schools which became very popular after the founding of the U. S. Military Academy in 1802. They fostered education for women and stimulated interest in teacher training and education. Many of them developed into normal schools or expanded into colleges to which some remained attached as special preparatory schools or departments.

Most important of all perhaps was their role in shaping and developing the public high school system. Despite the wide variety and flexibility of their curricula, after 1800 the academies became the principal gateway for entrance into college. For this reason, and because of their unique contributions to education, many states supported them with public funds. In a few states a movement was started to have a system of academies, one in each county. Both of these developments were in line with the theory of state-founded and state-supported institutions of higher learning, which was making considerable headway in practice. There was one difference. Except in a relatively few cases the academies remained under private control and continued to charge tuition. Private control in the case of early colleges was one of the very reasons for the eventual establishment of state universities. The same logic had to apply to the academics.

The movement to establish public high schools was slow in starting and slow in making headway. It had many obstacles to overcome. The very existence of private academies was an obstacle in itself and in many communities pride in local academies was deep-rooted and strong. These factors created in those communities a reluctance to supply by taxation, facilities for all which many had been willing to provide for their own children as means and opportunity allowed. But there was an increasingly large number of citizens who could not afford such education for their children or who believed that the concept of free public education, to be consistent, should include education on the secondary level.

This feeling was strongest in the towns and cities where the concentration of industrial workers and tradesmen was building up a large middle class who felt that their needs and rights should be considered. It is not strange, therefore, that the first two public high schools that were opened in 1821, were located in two rapidly growing industrial centers, Boston and Portland. A few other cities and towns in Massachusetts and in neighboring states soon followed suit. In 1827 Massachusetts passed a law requiring a public high school in every town with 500 or more families. Several New England states passed

similar laws, and the actions of these New England states marked the real beginning of the public high school movement. By 1880 there were fewer than a thousand high schools throughout the country, but their growth since then has been one of the phenomena of our educational history. In 1900 the number of high schools reached 6,000, the number of private academies in 1850. The high schools had double the enrollment of the 1850 academies and almost double the number of teachers. Beginning in 1890 the high school enrollments approximately doubled each decade through 1930. Since that time the increases have been proportionately less rapid, but the numbers have been truly staggering. After a peak enrollment of six and one-half million in 1940-41, the depression-caused decrease set in and continued through 1948-49. Since that year enrollments have gradually increased, and in 1954-55 they passed the 1941 mark. By 1959-60 they are expected to exceed eight million.

As the number of high schools increased, the academies began to lose ground. By a pedagogical fate, just as the academies had replaced the old grammar schools, the high schools gradually replaced their academic parents. By 1890 the situation was no longer in doubt. For the academies the result was somewhat ironic. They contracted their broad curricula and became in effect the new grammar schools of the late nineteenth century. As college preparatory schools they developed special techniques and found ready public acceptance. In that capacity they are best known today, and in them many discriminating parents find the kind of education and instruction they want their children to have.

Strongly influenced by the academies, the early high schools adopted their slogan: Preparation of youth for practical life. It is interesting to note that the curriculum of the "English Classical School," as the first high school was named in Boston, did not include any foreign languages, ancient or modern. As the name implied, the curriculum centered around English—grammar, literature, composition, and declamation. The next heaviest concentration was in mathematics which included arithmetic, algebra, plane geometry, navigation, surveying, and at least one additional course not named. Other subjects were ancient, modern, and American history; natural philosophy—natural science was the later name—including astronomy; logic, moral and political philosophy. Great emphasis was put on public speaking during the first two years. Science came only in the last year. The course lasted for three years and was open only to boys twelve or

more years of age. Separate high schools for girls were established also, but most high schools were for both sexes.

In time the curricula of the high schools varied as much as those of the academies after which they were patterned, and the new subjects introduced by both types caused some changes in college entrance requirements. By 1850 most colleges had added to their list algebra, geometry, geography, and ancient history. By 1880 physics and chemistry, several of the natural sciences, solid geometry and trigonometry, English literature and rhetoric were either required or acceptable. By that same date many of the colleges also accepted modern foreign languages, but in most instances still insisted on four years of Latin. Advanced mathematics was allowed by many colleges as a substitute for Greek.

Since the number of college-bound high school students was increasing, most high schools had to add Latin to their curricula. Many added Greek and modern foreign languages because of local demands. For the great majority of students, however, high school ended their formal education. To satisfy their needs and demands had been the primary function of the early high schools. To meet the needs and demands of both groups put a double burden on the high schools that grew increasingly heavy. This dual function caused instructional, administrative, and financial problems that have not yet been satisfactorily solved.

An additional complicating factor was introduced by the passage of state compulsory education laws. Massachusetts led the way in 1852. Many states vigorously opposed laws of this kind, and only twenty-six had enacted such legislation by 1890 and thirty-two by 1900. It was 1918 before the other twelve had come into the fold. Even without compulsory attendance, high school enrollments would have increased enormously in the natural course of nature and events. But the presence of a great body of students who had to stay in high school against their inclination created a situation for which there were no real educational or administrative precedents.

Throughout the years the widely differing interests and abilities of willing and eager students have presented enough problems in themselves. Those presented by unwilling or indifferent students have added enormously to the complex and difficult tasks of administrators and teachers and taxed the ingenuity and patience of all. The combined weight of all these diverse problems has had a great influence in the development of teaching methods and in the expansion of the

curriculum. Each of these would require separate treatment, but only the curriculum fits into the pattern of this study.

[1] The first embodiment of this principle is found in the *Massachusetts Law of 1642*. See *Cubberley*, pp. 12-26. For references and bibliography see Appendix A.

[2] The full name was Latin Grammar School. Since English grammar was not studied in England or America until well after 1700, the name was usually shortened to Latin School or Grammar School.

[3] Although the title is somewhat misleading, a very convenient and interesting account of our elementary and secondary school systems down to 1787 is found in "Public Schools During the Colonial and Revolutionary Period in the United States," by The Rev. A. D. Mayo. CR 1893-94, I, pp. 639-738.

[4] The number and caliber of the early teachers have perhaps been underestimated. For an excellent account of the teacher and his contributions to American education and life, see *The American Teacher*, by Willard S. Elsbree, American Book Co., 1939.

[5] Mather's funeral sermon bears the title, *Corderius Americanus*. It was adapted from the Latinized surname of Mathurin Cordier, a famous French teacher who died in the year Shakespeare was born, 1564. With a Latin title, but written in English, the sermon is one of the most amazing documents in American literature. See "Ezekiel Cheever and His Accidence," by John F. Latimer, *The Classical Weekly*, Vol. 43, No. 12 (March 6, 1950), pp. 179-183.

[6] *Knight* (1), pp. 122-23. *Cubberley*, pp. 428, 537-38, puts the date after 1800.

CHAPTER II

EDUCATION TAKES COUNT

The year 1867 marked a turning point in the history of public education in this country. In March of that year President Andrew Johnson appointed Henry Barnard the first United States Commissioner in the newly-created Department of Education. In July 1869 the Department lost its independent status and was made part of the Department of the Interior under the title Office of Education. The title was changed to Bureau of Education in 1870 but back to Office of Education in 1929. In July 1939 the Office was moved from the Department of the Interior to the newly-established Federal Security Agency, and in April 1953 it became a part of the Department of Health, Education, and Welfare.

The purpose of the original Department of Education, as stated in the enacting law, was to collect "such information and facts as shall show the condition and progress of education in the several States and Territories, and of diffusing such information respecting the organization and management of school systems and methods of teaching as shall aid the people of the United States in the establishment and maintenance of efficient school systems, and otherwise promote the cause of education throughout the country."[1]

Barnard interpreted the provisions of the law literally and liberally. The annual reports which he initiated surveyed the whole realm of public and private education from the primary school through college. They were contemporary documents that enabled educators and laymen in one section to compare their educational problems and progress with those in all other sections of the country, and with those in many foreign countries. They presented detailed summaries of educational congresses and exhibitions at home and abroad. They became the best single source in America of information about the theories of prominent educators, past and present, throughout the world.

of its kind in this country that was national—and international—in status and scope. It brought Barnard into national prominence, and became his model for the reports he wrote as U. S. Commissioner of Education.

Barnard's reports and those of his successors naturally gave the greatest amount of attention to American education. Some of the then current topics have a familiar ring. In 1870, for example, there were discussions of kindergarten culture; medical education; illiteracy; school supervision; society, crime, and criminals; and school finances. In 1886-87 (in 1882-83, the annual reports had been changed to coincide with the school year) there were special articles on the perennial problem of shortening and enriching school programs; in 1889-90, on methods to be employed in the reformation of juvenile offenders; in 1899-1900, on vaccination requirements in city schools; in 1909-10, on the physical welfare of school children, college and high school standards; and in 1914-15, on increasing facilities for practice teaching, national aid for vocational education, the kindergarten and educational experimentation, and the education of backward children.

Not so familiar are such items as: the relations of education to labor (1870); the English language in Indian schools (1886-87); educational training for railway service (1898-99); introduction of domestic reindeer into Alaska (1899-1900); movable schools of domestic science (1909-10); influence of state inspectors of high schools (1914-15).

One of the most important functions of the Bureau of Education was to act as a central clearing house for curriculum matters at all levels. In addition to specific articles dealing with curriculum problems and developments, each annual report contained various kinds of statistical tables. Although Barnard published many valuable data during his three years as Commissioner, the first systematic efforts to obtain curriculum information on the high school level did not begin until 1871. Between 1871 and 1949 the reports varied considerably, not only in completeness and accuracy, but also in the type and arrangement of statistical data presented.

During the first period, 1871-1875, the tables prepared by the Bureau gave state and national enrollments in three general curricula—English, classical, and modern languages. The figures were from private secondary schools only. The number of schools reporting increased from 638 to 1,143, and their enrollments from 80,000 to 108,000 during the period.

In the second period, 1876 to 1885-86, an effort was made to include

statistics from public high schools. Although the number of public high schools reporting increased from 192 to 471, and their enrollments from 23,000 to 70,000, most if not all of them were in city systems. During the same period the number of private secondary schools reporting increased from 1,229 to 1,440, and their enrollments from 106,600 to 151,000. Some general curriculum information, with state and national enrollments, was given for the private schools, but not for the public high schools.

Although there were variations from year to year, during both of these periods the national figures for private schools showed in general that enrollments in the classical and modern languages curricula were approximately the same. Together they totaled about half of the enrollments in the English curriculum. The number of students preparing for the classical course in college, on the other hand, was usually about twice as large as the number preparing for the scientific course both in college and in special scientific schools.

As the number of public high schools reporting to the Bureau increased, their enrollments became sufficiently large to merit separate tabulation of statistics. This was done for the first time in 1886-87. The figures were presented in two separate tables, one for schools supported wholly by public funds, the other for those only partly supported by such funds. There were 419 schools in the first category, 96 in the second. Their combined enrollments equalled 80,000. The total enrollment of the simon pure public schools outnumbered that of the others six to one.[3]

The curriculum data provided set a pattern that was to continue for many years. Instead of enrollments in each of three curricula—classical, modern languages, and English—those for five different subjects were tabulated. These were Latin, Greek, French, German, and English.[4]

Subject percentages were given for each state, for each of five geographical regions into which the states were divided, and for the country as a whole. Thus, for the first time in the history of American education, it was possible to get some idea of what the public high school students were studying, and how the subject enrollments varied, in the different sections. That the list of subjects was far from complete was indicated by the tabulation for 1887-88. In that year figures and percentages for mathematics, physics, chemistry, and other sciences not named, were added. Since all of these figures came primarily from city school systems,[5] two years more were to

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elapse before a fairly comprehensive picture of the high school curriculum appeared.

Tbis was made possible hy a startling development. In 1888-89 the number of public high schools reporting hnd incrensed to 713. Their total enrollment wns 125,500. In that same year 1,324 private secondary schools reported, with a total enrollment of 146,500. One year later tbe situation was abruptly reversed: 2,526 puhlic high schools reported, witb a total enrollment of 203,000. Tbis was in sharp contrast to a total enrollment of 95,000 reported in 1,652 private schools. The number of public high schools had not more than tripled within the space of one year; the Bureau hnd simply succeeded in reaching more of them outside of cities. The puhlic high school had clearly become the dominant feature on tbe sccondary education landscape.

Before describing some of the statistical changes thnt took place in 1889-90, which continued for varying periods, it is necessary to add a few words ahout the annual reports. They continued to appear each year through 1914-15. But the tremendous increase in the numher of bigh schools and in high school enrollments made the tnsk of gathering and tabulating statistics more and more complex nnd expensive. Beginning in 1916 tbe reports were issued biennially. The last complete report covered tbe biennium 1952-54.[8]

The tremendous increases in high school enrollments also affected tbe gathering and puhlication of curriculum statistics. From 1886-87 tbrough 1905-06 individual subject enrollments and percentages were published each year, but tbereafter at varying intervals: 1909-10, 1914-15, 1921-22, 1927-28, 1933-34, and 1948-49.[9] Statistics of enrollments and percentages according to curricula also varied. Through 1909-10 enrollments and percentages were given in two curricula, classical and scientific. Between 1910-11 and 1913-14 figures were given for eight different curricula: classical, scientific, commercial, manual training, teacher training, agricultural, domestic economy, and academic. In 1914-15 enrollment figures in the scientific, and classical curricula were omitted; they were possibly included under the academic. After 1914-15 no curriculum statistics of any kind appeared except for the four years indicated above. In those years enrollments according to curricula were not given, and regional tabulations were discontinued.

Several other features of the annual reports deserve mention. Each of the 18 reports hetween 1890 and 1910 inclusive that contained complete curriculum surveys also gave information ahout the college plans

of the students. One set of data gave the number and percentage of the total high school population that were preparing for college. Another set broke this down according to sex, and according to the college curriculum, classical or scientific, for which the students were preparing. Still another, the total number and percentage of the graduates who were *prepared* for college, the percentage of boys who were prepared, and the percentage of girls. These last data did not indicate the particular curriculum for which they were prepared.

Most of this information, except that dealing with the two curricula, was also given in the four curriculum surveys made between 1915 and 1934, or could be obtained from data contained in them. A special table in the survey of 1933-34 summarized these statistics for graduates of the classes of 1921, 1925, 1929, and 1933.[7]

Another special feature of considerable importance for this study remains. Because of its bearing on the curriculum problem, discussion of it is reserved for the next chapter.[8]

[1] CR 1870, p. 5. For an explanation of the abbreviations used in this study see Appendix B.

[2] CR 1886-87, Table 31, pp. 496-99; Table 33, pp. 512-13. Tables 32 and 34 gave statistics for private schools. For a useful statistical review of the number of all secondary schools and students reported to the Bureau of Education between 1871 and 1894, see CR 1893-94, I, pp. 30-37.

[3] In the tabulation of subjects in private schools for girls, Greek and English were omitted. In the private schools for boys and in those for both sexes, another category, "not distributed," was added. These differences made it impossible to compare subject enrollments in the public high schools with those in the private schools, interesting as such a comparison might have been.

[4] Despite their incompleteness, the figures and percentages for these two years are used in Chapter IV, where the developments of the different subject matter fields are traced.

[5] Chapters of report were published in 1956 and 1957.

[6] From 1890 through 1910 the statistics included the number and percentage of boys and of girls studying the various subjects. From 1915 through 1934 only figures were given, but these made it possible to calculate the respective percentages. For this type of information in certain subjects see Appendix C.

[7] See Appendix D for several historical tables dealing with high school students and college.

[8] This statement is not intended to imply that such discussion will exhaust the various types of information given in the reports issued by the Office of Education. Only those have been mentioned which fit into the purpose of this study.

CHAPTER III

AN INNOCENT PARADOX

In our system of puhlic education thc high school has long playcd a dual role. As pointed out in Chapter I, its original function was to prepare students for practical life. But under the pressure of diverse needs of a democratic society this function was gradually enlarged to include preparation for college. In its nttempts to carry out this twofold mission, the high school was caugbt on the horns of n perplexing curriculum dilemma.

The story of this dilemma has been strangely neglected in the current controversy ahout the bigh school nnd its place in our educational life. It is to he found in tbe reports publisbed by the United States Office of Education. But valuable as those reports are, they have become, with one exception, the nll but forgotten documents of American education. And paradoxically enougb, that one exception contains the innocent cause of some of the confusion tbat exists today nbout the development of the bigh scbool curriculum. An explanation of the paradox is in order.

A hrief account of tbe curriculum surveys made by the Office of Education was given in tbe preceding chapter. Althougb tbe surveys varied in the amount and kind of statistical information presented, two features remained constant in all the surveys made hetween 1889-90 and 1948-49. Among the various tables there was always one that gave state and national subject enrollments, and another that gave corresponding percentages for certain suhjects.

In 1889-90 another table was added tbat gave national subject enrollments and percentages only. It provided a convenient national summary of curriculum developments and showed at a glance the proportion of high school students enrolled in various subjects. As the summary table appeared year after year, it became historical in nature. In the Annual Report for 1894-95, for instance, the summary table showed the proportion of high school students enrolled in various subjects each year between 1889-90 and 1894-95 inclusive. In the Annual Report for 1899-1900 the historical summary table gave similar percentages for the years 1889-90 to 1899-1900 inclusive. In

the Report for 1904-05, it covered the years 1894-95 to 1904-05, but in the period 1909-1910, the years 1889-90 to 1909-10 were covered.[1]

In 1914-15 three changes were made in the historical summary table: actual subject enrollments as well as percentages were given; instead of using each annual summary table since 1889-90, those at five-year intervals were chosen, and the total high school enrollment for each of those years was included. This format and type of selectivity occurred in each of the other four historical summary tables published.[2]

Through 1914-15 the subjects listed in the historical summary tables corresponded very closely to those in the longer and more detailed statistical tables. The differences between the two first became noticeable in 1899-1900, but they did not become pronounced until 1921-22, as the following table shows:

TABLE A[1]

CONTRAST BETWEEN NUMBER OF HIGH SCHOOL SUBJECTS TABULATED IN DETAILED STATISTICAL TABLES AND IN HISTORICAL SUMMARY TABLES IN CERTAIN YEARS BETWEEN 1889-90 AND 1948-49

	1889-90	1899-1900	1909-10	1921-22[3]	1933-34[3]	1948-49[3]
Detailed Tables	13	29	35	68	111	141
Historical Tables	13[2]	18	23	44	47	52

[1] The Annual Reports for these years were used as the primary basis for this study. For the number of subjects in the "detailed tables," see Chapter V, Table 14.

[2] Since the table for this year contains statistics for that year only, it is not strictly historical.

[3] During these years some related subjects were grouped under a single heading in the historical summary tables. The figure 44, 47, and 52, therefore, are not quite accurate.

In this table the number of subjects was listed in the second line as they were given in the historical summary tables of the year indicated. In 1933-34 and again in 1948-49, however, the historical summary tables omitted some of the subjects previously listed in those of a given year. These numerical differences are shown in the table on the next page.

TABLE B [1]

CONTRAST BETWEEN THE NUMBER OF HIGH SCHOOL SUBJECTS TABULATED IN DETAILED STATISTICAL TABLES IN CERTAIN YEARS BETWEEN 1889-90 AND 1948-49 AND THE NUMBER TABULATED FOR THOSE YEARS IN THE HISTORICAL SUMMARY TABLES OF 1933-34[2] AND 1948-49[3]

	1889-90	1899-1900	1909-10	1921-22	1933-34	1948-49
Detailed Tables	13	29	35	68	111	141
Historical Table 1933-34	12	16	21	43	47	
Historical Table 1948-49	12	14	20	40	46	52

[1] See footnotes 1, 2, and 3 of Table A above.
[2] *Bul.* 1938, *No.* 6, Table 1.
[3] BS 1948-50, Ch. 5, Table 7.

Although the differences between the figures in the historical summary tables of 1933-34 and 1948-49 are slight, the contrast between them and the figures in the detailed tables is progressively greater from 1889-90 on. This has led to the paradox mentioned in the second paragraph of this chapter.

Chapter 5 of the Biennial Survey for 1948-50 contains the last curriculum survey on a national basis made by the U. S. Office of Education. It is naturally more widely available and readily accessible than any of the others. Various critical and defensive comments made in recent years indicate that Table 7 of this chapter has been used as the basis of comparison between the curriculum of today and that of fifty and sixty years ago. Tables A and B show at a glance how unsafe and misleading a comparison based on such a source would be. A few small examples will partially illustrate the point.

Table 7, referred to above, lists Earth Science as having been taught from 1900 on. Reference to the original documents shows that the subject was first listed in 1948-49. In that year astronomy, geology, physical geography, and possibly a subject called earth science were all grouped together in Table 7 under the heading *earth science*.[3] The first three subjects were listed separately through 1933-34.

Reference to the original documents also shows that astronomy was taught in the high schools of the country from 1895 through 1933-34, and Greek from 1890 through 1927-28. The omission of these two subjects from Table 7 might lead to the erroneous conclusion that they had never been offered in the high schools at all.

But the most startling omission of all is English, which is not listed until 1900. What would this mean to the casual reader of Table 7? That some time between 1890 and 1900 English was finally introduced into the high school curriculum? And what would the same reader judge about the percentage of students enrolled in English? Table 7 shows a steady increase between 1900 and 1949. Subject enrollments, as the table correctly shows, did increase during that period. What the table does not correctly show is that proportionately subject enrollments were greater in 1910 and 1915 than before or since. English was in the curriculum in 1890 and long before—in two forms: Rhetoric and English Literature. The Office of Education did not collect reliable data on the former until 1894-95 or on the latter until 1897-98. From 1900 through 1915 even the figures and percentages given tell only half the English story!

These examples show some of the limitations of Table 7 and with what caution it must be used even for the subjects actually listed. It does provide a convenient overview of curriculum developments in "certain" subjects between 1890 and 1949. That is all. To use it as a complete and sufficient summary of the curriculum story is to mistake its purpose; to draw conclusions on the basis of partial evidence can only result in confusion and misunderstanding.

One additional fact will emphasize the importance and necessity of presenting all the evidence before the developments that have taken place in the high school curriculum can be made plain to the American people. The fact is very simple, but it has been largely overlooked in recent years: Before 1909-10 not a single historical summary table listed a single non-academic subject. In 1909-10 only two were listed, agriculture and domestic economy. Since the subjects listed in each historical summary table were repeated, with some variations and omissions, in later tables, to the casual observer or commentator one conclusion might seem reasonably obvious, to wit: before 1909-10 the high schools offered only academic subjects. As the original documents of the curriculum surveys receded more and more into the limbo of the past, such a conclusion might be considered even more reasonable in recent years than ever before.[1] But reasonable or unreasonable, the conclusion is wrong, as the next chapter will show.

[1] The 1909-10 summary table was based on the summary tables of 18 years. As pointed out in Chapter II, statistics on individual subject enrollments and percentages

were published each year between 1889-90 and 1905-06, and thereafter in 1909-10, 1914-15, 1921-22, 1927-28, 1933-34, and 1948-49.

[2] For the years in which they appeared in the Annual Reports see Note 1 above.

[3] BS 1948-50, Ch. 5, Table 7. See also pp. 13-14, and the writer's Chapter IV, Table 3.

[4] Chapter 5 of BS 1948-50, which contains Table 7, referred to so often, was published in the fall of 1951.

CHAPTER IV

A BAKER'S DOZEN

The three-thousandfold growth in high school enrollments since 1890 has brought in its wake many problems. Public discussion has produced great awareness of many of them, such as teacher shortages and salaries, inadequate school buildings and equipment, and has put these and related problems into sharp fiscal and educational focus.

But in our concern for such tangible matters we have tended to overlook the real foundation of our educational house—the course of study or curriculum. It too has had a phenomenal growth. At the rate of six courses each academic year it would take a student almost 46 years to complete all of the 274 courses offered by the high schools in 15 or more states in 1948-49![1] At the same rate a student could have finished all the courses offered in 1889-90 in a maximum of six years.

Such quantitative changes between 1890 and 1949 did not take place all at once, but they did occur more rapidly than is commonly known. The rate at which new subjects came into the curriculum, the nature of the additions, and the shifts in educational emphasis that resulted, make a story that is known primarily to school administrators and historians. Some account of that story, as part of our educational history, may have interest in itself. Some acquaintance with it may give us a better background for understanding the educational problems that confront us today.

It was pointed out in Chapter II that the curriculum pattern in public high schools first began to emerge in 1889-90. Between that year and 1948-49 the U. S. Office of Education published 26 Annual Reports and 17 Biennial Surveys. These 43 reports contained 23 complete curriculum surveys. Six of these, selected as closely as possible at ten-year intervals, were used as the primary basis for this study. They appeared in 1889-90, 1899-1900, 1909-10, 1921-22, 1933-34, 1948-49.[2]

Tables listing all subjects offered during each of these six years would be extremely interesting and useful. They would show the progressive additions to the curriculum in all subject matter fields, as the high school expanded its efforts to satisfy the diverse educational needs and abilities of a constantly increasing high school population.

Such comprehensivc tahles for the years after 1909-10, however, would he impractical hecause of their length. Comments ahout so many different suhjects in the last three survey years would hccome confusiog. The trees would he lost in the forest. To overcome these difficulties, at least in part, it seems feasihle and logical to present the additioos as they occurred in each of the thirteen hroad suhjcct matter fields into which the high school curriculum was eventually divided—a haker's dozen.

In the tahles tbat follow statistics for each separate suhject are given as percentages. Each percentage shows the proportion of high school students studying a given suhject in each of the six selected years. To give some approximate clue to the actual numhers, the total high school enrollment in thousands, grades 9-12, is given, in two separate figures for three of the years, immediately under each year listed.[3] These figures are repeated in each of the thirtcen tahles.

Each tahle also contains total percentages, and the total numher of suhjects offered during a given year. The "total percentages" provide a convenient way of comparing all enrollments in one suhject matter field with those in another. Since many students often study more than one suhject in a given field, the suhject enrollments in that field often represent, *not different* students hut *all* students taking different suhjects in the field at the same time. English is a good example (see Tahle 5). Total percentages, therefore, show the relative strength or popularity of each suhject matter field in the same year, and indicate the proportionate changes that took place in each field year after year.[4]

The Bureau of Education puhlished fairly complete statistics on only four of the tbirteen subject-matter fields for 1890. Data on three others were published for 1900, aod on three more for 1910. Informatioo on all tbirteen was puhlished for tbe first time for the year 1914-15.

Tbese facts determined the order of presentation, with one exception, for tbe tables that follow. That exception, Teacber Trainiog, is placed at tbe end of tbe chapter for two reasons: separate statistics on specialized courses, wbich were uodoubtedly offered, were oot available. Altbougb it played a negligible role io tbe bistory of tbe bigh school curriculum, it is included as a separate subject-matter field.

After tbe statistical data are presented io eacb table, a brief bistorical sketcb traces tbe developments withio tbe subject-matter field, with comments on some of tbe more significaot cbanges. As will be noted in various instances, maoy of the subjects were actually io tbe

high school curriculum some years before the Office of Education began to collect statistics on them. When the year in which the data were first published does not coincide with the first entry in a table, the date is given in parenthesis under or after the subject.

TABLE I[1]

MATHEMATICS: PERCENTAGE OF PUBLIC HIGH SCHOOL STUDENTS GRADES 9-12 ENROLLED IN MATHEMATICS BY TYPE OF COURSE IN CERTAIN YEARS BETWEEN 1889-90 AND 1948-49

	1890	1900	1910	1922	1934	1949
Enrollment in 1000's	203	519	739	2,155	4,497	5,399
			915	2,230	5,621	
Algebra	45.4	56.3	56.9	40.2	30.4	26.8
Geometry[2]	21.3	27.4	30.9	22.7	17.1	12.8
Trigonometry (1891-92)		1.9	1.9	1.5	1.3	2.0
General Mathematics					3.0	13.1
Arithmetic[3]				10.5	4.4	
Mathematics Review[4]						0.3
Total Percentages	66.7	85.6	89.7	74.9	56.2	55.0
Total Subjects	3	4	4	6	6	7

[1] Primary statistical sources for each year in this and subsequent tables are given in Appendix B. Specific reference to them and to other sources will be made as necessary. For the two enrollment figures between 1910 and 1934, see the reference in Note 3 of text. For subject percentages in the fall of 1952, 1954, and 1956, see Note 11 below.

[2] Figures for plane and solid geometry were not separated until efter 1921-22. They show that plane geometry was largely studied for a year, solid, for a half-year. In this table they count as two subjects.

[3] In BS 1948-50, Ch. 5, Table 7, the figures and percentages for 1922 and 1924 are given under the entry for general mathematics. Arithmetic is not listed.

[4] Although several subjects or courses are included, the figures are negligible. All are counted as one subject.

Mathematics played a relatively small part in the curriculum of the colonial grammar schools. Although students learned some of the elements of arithmetic before entering the grammar school, for many years little effort was made to add to the instruction already given. The early colonial colleges included arithmetic in their curricula, and did not require it for entrance until after 1802.

The practical need for mathematics, as preparation for trade and business, was first met by the evening schools that began to spring up toward the end of the seventeenth century. Students in these schools did not usually go to college. After 1750 the private academies, following the lead of the evening schools, taught such subjects as commercial arithmetic, algebra, geometry, surveying, and navigation.

Their mathematics curricula were more extensive than those in most colleges and were instrumental in causing the colleges to add algebra (about 1820) and geometry (about 1844) to their entrance requirements. After 1821 the early public high schools, for many years primarily in cities, adopted the mathematics pattern of the academies. By 1887-88, and probably some years before that date, mathematics in all of its branches was the most popular high school subject.[5]

Among the individual subjects in mathematics, algebra has been consistently the strongest. Through 1933-34 there were generally two courses, elementary and advanced. By 1948-49 an intermediate course had been added. The table shows that algebra's percentage increased up to 1910. According to the records it increased only through 1905-06, when it reached 58 percent. Although it had dropped only slightly by 1910, its decrease after that was rather rapid. This percentage decrease was probably caused primarily by the decline of enrollments in elementary algebra. It is fairly certain that this was the case between 1933-34 and 1948-49. In both of these years enrollments in second-year algebra equalled about one-third of those in elementary algebra. But the percentage of ninth grade students enrolled in elementary algebra dropped from 70 in 1933-34 to 63.5 in 1948-49.[6]

One factor in the percentage decline of elementary algebra enrollments has been the competition of arithmetic and general mathematics. Even if it is true that only advanced arithmetic was offered in 1921-22,[7] in 1927-28 an elementary course, under the term *general mathematics*, was added.[8] In 1933-34 elementary and advanced arithmetic and general mathematics were listed separately, and in 1948-49, general mathematics and advanced general mathematics. Although arithmetic was not listed at all in the latter year, it was assumed, when it was reported as a subject in the ninth grade, that it was general mathematics.[9] It is probably pure coincidence that the percentage in algebra and general mathematics (both courses) in 1948-49 totaled approximately the percentage of algebra alone in 1921-22.

Since plane geometry would not ordinarily be studied by a student who had not had at least a year of algebra, decline of elementary algebra percentages meant an almost inevitable decline of those in plane, but not necessarily in solid geometry or in trigonometry. In 1933-34 enrollments in plane geometry were almost nine times as large as those in solid; in 1948-49, almost seven times as large. During this period actual enrollments in plane geometry decreased, those in solid geometry and in trigonometry, increased. The explanation would seem fairly obvious. General mathematics, which increased consid-

erably during this same period, attracted the weaker students away from first-year algebra. The beginning algebra students were better on the whole, and a larger number of them continued beyond plane geometry into solid geometry and an even larger number into trigonometry. This was probably the first time in high school history that trigonometry enrollments were larger than those in solid geometry. The percentage of students enrolled in trigonometry was higher between 1891-92 and 1897-98 than in any year since, through 1948-49. The lowest was 2.3% in 1897-98; the highest was 2.9%, in 1893-94.[10]

As the table shows, the turning point in mathematics was reached in 1910. Between 1890 and 1910 the percentages in algebra and geometry increased; proportionately, geometry's gain was slightly greater. During the twenty-year span geometry climbed slowly to its percentage peak; algebra reached its peak in 1906, but maintained a higher level in 1910 than in 1900. After 1910 a proportionate decline for both subjects set in. Between that year and 1922 algebra's loss was proportionately greater; between 1922 and 1934 the proportionate losses of the two subjects were about equal, but between 1934 and 1949 those of geometry were significantly larger.

Trigonometry, listed first in 1891-92, reached its percentage peak quickly—in 1893-94. After a period of proportionate decline through 1904-05, it began a gradual recovery, and in 1910 regained its 1900 level. Between 1910 and 1934 it reached an all-time low-water mark, but by 1949 it was slightly above its 1900 level.

Arithmetic, listed first at its percentage peak in 1922, hit a deep depression in 1934, but with the help of general mathematics reached a new peak in 1949. Despite the assistance of these two subjects, however, the total percentage in mathematics was less in 1949 than the percentage of algebra alone between 1897 and 1910.[11]

From colonial times down to about 1850 Latin and Greek constituted the educational twin suns around which the rest of the curriculum revolved. They were the be-all and know-all and almost end-all of the schoolboy's existence.

During this whole period, Latin was the major planet. To read Latin like English was a commonplace; to write Latin in a barbarous and anglicized imitation of Cicero was the mark of superiority; to speak Latin—as many did in some fashion—was a pre-ordination, first for Harvard or William and Mary or Yale, and then for the ministry or law or pedagogy.

TABLE 2

FOREIGN LANGUAGES: PERCENTAGE OF PUBLIC HIGH SCHOOL STUDENTS GRADES 9-12 ENROLLED IN FOREIGN LANGUAGES BY TYPE OF COURSE IN CERTAIN YEARS BETWEEN 1889-90 AND 1948-49

	1890	1900	1910	1922	1934	1949
Enrollment in 1000's	203	519	739	2,155	4,497	5,399
Latin			915	2,230	5,621	
German	34.7	50.0	49.0	27.5	10.0	7.8
French	10.5	14.3	23.7	0.0	2.4	0.8
Greek	5.8	7.8	9.9	15.5	19.9	4.7
Spanish	3.1	2.9	0.8	0.09		
Italian			0.7	11.3	6.2	8.2
General Language				0.02	0.2	0.8
Total Percentages					0.01	0.2
Total Subjects	54.1	75.6	84.1	55.0	35.7	22.0
	4	4	5	6	6	6

Between 1850 and 1890, Latin and Greek apparently went into an eclipse from which Greek never recovered. The earliest statistics available, although incomplete and perhaps inaccurate, show that the percentage of Latin enrollments declined from 37.0, in 1886-87," to 34.7, in 1889-90. That was a low point for Latin until 1917-18 or 1918-19. During this period it reached a high point of 50.8% in 1903-04. In the same period, between 1898-99 and 1905-06, a little over 50% of the high school students studied Latin each year. In the six years immediately preceding 1898-99 the percentage varied from 43.1 to 49.7; from 1909-10 to 1913-14, it varied from 49.0 to 40.0.

The study of Latin has been declining since 1903-04. Its greatest loss was between 1909-10 and 1914-15, when it declined from 49.0% to 37.3. This was almost equalled by the loss between 1921-22 and 1933-34, as shown on the table.

Greek, never as strong as Latin even in colonial times, began to decline still further after 1886-87, when it reached a high point of 4.0%. It fell below 3.0 for the first time in 1899-1900. Its greatest loss came between that year and 1909-10, a period during which it was finally abolished as a college entrance requirement. Although it was listed among the regular high school subjects through 1927-28, after that year it was offered in only a few high schools of several states. It is now almost a lost continent on the high school map.

One factor in the decline of Greek was undoubtedly the growing

popularity of German and, to a less extent, of French. Some years before 1800 the academies had introduced French and German, and occasionally Italian, into their curricula. The early high schools, also emphasizing "practical" subjects, enlarged their language offerings for a time. But the opposition of the classicists was strong and qualified modern language teachers were scarce. In the 1870's, however, French and German won the final skirmish with Greek and Latin and became acceptable for entrance into most colleges.[13]

Although German declined between 1886-87 and 1889-90, after the latter year it increased gradually to its percentage peak of 24.4 in 1914-15. If it had not been for World War I, it almost surely would have overtaken Latin by 1921-22. But the war put a stop to all that. The Germans lost on land, on sea, and in the American classroom, where their language has been all but lost ever since. Its slow gains through 1933-34, and for a few years after, were again interrupted, and it became a war casualty for the second time.

Of the three modern languages, German was almost twice as strong as French until 1899-1900, about two and one-half times as strong between 1900 and 1909-10, almost three times as strong in 1914-15. French did not reach its percentage peak until 1921-22, but until recently it has declined consistently since then. Spanish began struggling for a foothold around 1900, and finally gained a place on the linguistic altas in 1909-10. It also reached its percentage peak in 1921-22. After a period of decline through 1933-34, it began to climb and in 1948-49 nosed out Latin for the first time as the leading high school foreign language.

Between 1890 and 1915 Latin was considerably stronger than all the other foreign languages combined. In 1927-28 the others pulled slightly ahead and increased their lead by a small margin in 1933-34. In 1948-49, with the weak help of Italian and general language, they outnumbered Latin students almost two to one.[14]

The battle of science for a place in the high school galaxy took place between 1850 and 1890. Natural philosophy, as physics was first called, and chemistry were considered practical subjects, in contrast to languages, literature, and history, and their values for mental discipline were long doubted. By 1887-88, however, the battle had been won. In that year over 72% of the high school students were enrolled in science courses. Physics was in the lead with 25.2%. Chemistry came next with 12.9%. Other science courses, not identified, totaled 34.5%.[15]

TABLE 3

SCIENCE: PERCENTAGE OF PUBLIC HIGH SCHOOL STUDENTS GRADES 9-12 ENROLLED IN SCIENCE BY TYPE OF COURSE IN CERTAIN YEARS BETWEEN 1889-90 AND 1948-49

	1890	1900	1910	1922	1934	1949
Total Enrollment in 1000's	203	519	739	2,155	4,497	5,399
			915	2,230	5,621	
Physics	22.8	19.0	14.6	8.9	6.3	5.4[1]
Chemistry	10.1	7.7	6.9	7.4	7.6	7.6[2]
Physical Geo. (1894-95)		23.4	19.3	4.3	1.6	
Geology (1894-95)		3.6	1.2	0.2	0.1	
Astronomy (1894-95)		2.8	0.5	0.1	0.1	
Earth Science						0.4[3]
Zoology			7.0	1.5	0.6	0.1
Physiology (1894-95)		27.4	15.3	5.1	1.8	1.0
Botany			15.8	3.8	0.9	0.1
Biology			1.1	8.8	14.6	18.4
General Science				18.3	17.7	20.8
Aeronautics						0.3
Total Percentage	32.9	83.9	81.7	58.4	51.3	54.1
Total Subjects	2	6	9	10	10	11

[1] Includes advanced and applied physics, fundamentals of electricity, radio and electronics, and fundamentals of machines. Enrollments in each of these were so small that the percentages were negligible. Not counted as separate subjects.
[2] Includes applied chemistry, which had a minute percentage.
[3] See Ch. III, Note 3. Counted as three subjects.

Although these figures were not complete or wholly accurate, there is little doubt that physics and chemistry were only two of several science subjects being offered in the high schools of the day. In 1889-90 statistics were confined to physics and chemistry, but five years later four other sciences were reported, two of which, physical geography and physiology, had enrollments larger than physics and considerably larger than chemistry. Physical geography increased during the next year. Although it decreased slowly until 1914-15, it maintained a sizeable lead over physics until 1909-10, but was only slightly ahead in 1914-15. Physiology followed almost exactly the same pattern. It ran, slightly but consistently, ahead of physical geography until 1904-05, fell slightly behind in 1909-10, and considerably behind in 1914-15. In 1921-22 physics, which had been declining slowly since 1893-94, was almost as strong as physical geography and physiology combined. Physics continued to lose through 1948-49, and the other two by that year had almost disappeared from the curriculum. Physical geogra-

phy was grouped with geology and astronomy, which were listed for the first time in 1894-95, under the general term of earth science. If physiology had been less human, it might have suffered the same anonymity.

Through 1909-10, as indicated above, physical geography and physiology were the chief rivals of physics for high school science honors. Chemistry, which fluctuated less than the other three, was the fourth member of the quartet until 1909-10, when it was replaced by a newcomer, botany, which ranked second to physical geography that year. Botany entered in full flower, but it faded rapidly, and by 1948-49 was hanging on by only a stamen. Zoology entered the lists with botany, but at a lower level, and by 1948-49 it was being kept alive by the artificial heartbeats of a frog.

The greatest drop in the science field took place between 1909-10 and 1921-22. In this period the five leading subjects, physics, physical geography, physiology, botany, and zoology suffered their most drastic losses, and two new subjects entered the field. The two newcomers, biology and general science, were destined to attract over half of the total high school enrollments in science, and this they proceeded to do as early as 1927-28, possibly a year or two before. In 1933-34 these two subjects alone had 62% of the enrollments in science; in 1948-49, 72%.

A law of diminishing returns seems to have been at work in the sciences. Statistics on four new subjects were collected in 1894-95. A year later enrollments in science reached their high point and lacked only a little of tripling enrollments of 1889-90. The addition of three other subjects in 1909-10 did not check the general decline, however, which had begun after 1895-96. Between 1909-10 and 1921-22 chemistry and biology alone increased, but their gains, augmented greatly by general science, were not enough to offset the decreases in all other science subjects. The general decrease continued through 1933-34, despite a slight gain in chemistry and a considerable gain in biology. Between 1933-34 and 1948-49 chemistry held its own; the increases in biology and general science were sufficient to offset the losses in all other subjects and to show a slight gain in the whole field.[19]

The changes that took place in the number and variety of social studies constitute one of the most striking phenomena in the development of American secondary education. During the colonial period history did not appear as a separate subject. Some ancient history was learned in connection with the study of Latin and Greek authors.

TABLE 4

SOCIAL STUDIES: PERCENTAGE OF PUBLIC HIGH SCHOOL STUDENTS GRADES 9-12 ENROLLED IN SOCIAL STUDIES BY TYPE OF COURSE IN CERTAIN YEARS BETWEEN 1889-90 AND 1948-49

	1890	1900	1910	1922	1934	1949
Enrollment in 1000's	203	519	739	2,155	4,497	5,399
General History[1]	27.3	38.2	915 55.0	2,230	5,621	
English History				2.9	0.5	
Ancient History				17.2	6.8	1.5[8]
Medieval History				15.4[2]	6.2[2]	
Modern History						2.1
American History				15.3	17.4	32.3[4]
World History (1927-28)					11.9	16.2
State History					0.4	2.7
Latin American History						0.5
Industrial History					0.2	
Civil Gov't. (1897-98)		21.7[6]	15.6[3]	19.3[7]	6.0	8.0[6]
Com. Gov't. (1914-15)					10.4	9.5[7]
Psychology (1894-95)		2.4	1.0	0.9	0.3	0.9
Geography					2.1	
American Geography						0.6
World Geography						5.0
Prob. of Dem. (1927-28)					3.5	5.2
International Relations					0.2	0.2
Economics				4.8	4.9	4.7
Sociology				2.4	2.5	3.4
Consumer Education						0.6
Occupations					3.0	3.9
Orientation						2.1
Social Studies					2.5	
Total Percentages	27.3	62.3	71.6	78.2	78.8	99.4
Total Subjects	4	7	7	10	18	20

[1] This was the term used in 1889-90. In the next two surveys given in the table the entry read: "History (other than United States)." In BS 1921-22, Ch. 6, Tables 33 and 34, enrollments and percentages for four separate history subjects were given for the first time: American, English, ancient, medieval and modern. The historical summary table (Table 32) for that year lists these four as being in the curriculum since 1889-90, but the figures and percentages were not separated until 1921-22, as just indicated.

[2] Includes medieval history.

[3] Includes modern history (European).

[4] Approximately 9.5% of the total high school enrollment studied U. S. history in the ninth grade (Note 17 below), and 22.8%, in grades 10-12 or 31.6% of the total enrollment in those grades.

[5] Includes community government or civics. Enrollment figures for the two subjects were separated in 1914-15, combined in 1921-22, and separated thereafter.

[6] This was 11.1% of the enrollment in grades 10-12.

[7] See note 17.

The *Epitome* of Roman history, written by Florus in the second century, and the *Breviarium* of Eutropius, a survey of Roman history written in the fourth century, were common grammar school texts. Bilingual editions of these and of other classical historians and biographers, such as Herodotus, Thucydides, Livy, Suetonius, Tacitus, and Nepos, were in vogue, but they were read more for their grammatical or literary values than for their historical content.

Ancient history was first introduced into the curricula of the private academies, which began to spring up after 1750, and the early public high schools followed their example. By 1844 it was listed among college entrance requirements, and by that time courses in general history were being taught in many of the high schools and academies. It included ancient, English, medieval and modern European history.

Up until 1870 the teaching of American history was largely confined to the elementary schools. Although it was introduced in many high schools after that date, it did not make much headway until after the first world war. The first separate statistics on it appeared in the curriculum survey of 1921-22. Ancient history was still in the lead, with medieval and modern history next, American history a close third, and English history a weak fourth. Of these four only American history showed a gain in 1933-34, and again in 1948-49. By the end of this period the other three had almost disappeared from the curriculum, possibly because of the introduction of world history, first listed in 1927-28. The sevenfold increase in state history between 1933-34 and 1948-49 is an interesting local phenomenon, but it probably had little influence on the study of other subjects in history. It is also interesting to note that the Good Neighbor Policy had little effect on the high school history curriculum.

The social studies curriculum expanded slowly until 1921-22. After history, psychology was the first to enter. Never strong, it reached its percentage peak in 1894-95. By 1933-34 it had almost faded away, and its hold on life in 1948-49 was still precarious. Civil or American government entered the listings at its peak. Although community government or civics came in around 1909-10 or earlier, statistics for civil and community government were not separated until 1914-15. The former was slightly in the lead. By 1927-28 civics, which was primarily a ninth grade subject, had gained a two-to-one lead, but that lead was slightly reduced in 1933-34. During the period between that year and 1948-49 civil government made a small gain, despite competition with problems of democracy, a newcomer in 1933-34. The introduction of problems of democracy, which combines the funda-

mentals of civil government, sociology, and economics, may account for the slight decrease in economics and for only slight increases in civil government and sociology. Since all of these subjects are offered usually in grades 10-12, they probably had little influence on enrollments in civics in 1948-49, estimated for that year as 9.5% of the total high school enrollment.[17]

Geography as a separate high school subject was first listed in 1933-34. By 1948-49 it had been separated into world and American geography, with the former leading a little over eight to one. Study of occupations and social science studies were first listed in 1933-34. The latter, which were general in nature, did not last long and apparently succumbed to the depression. Other social studies, such as international relations, consumer education, orientation, and industrial history, have played a very minor—and inconsequential—role in the curriculum.

Although many social studies were added from 1921-22 on, the study of history always received major emphasis. Enrollments in history doubled between 1889-90 and 1909-10. Although it has declined proportionately since 1910, its gains in the period between 1933-34, when it reached its low point, and 1948-49 were greater than its losses between 1921-22 and 1933-34. Increase in the study of American history accounted for most of the gains. In 1948-49 enrollments in American history were 62% of all history enrollments. World history came next with 31%, far in advance of ancient history, the leading subject in history through 1921-22.

The next most popular field was civil and community government. Although 1899-1900 saw the greatest proportion of student enrollment, its greatest loss was between that year and 1909-10. It made a strong recovery by 1921-22, dropped back slightly in 1933-34, but regained some of its loss by 1948-49.

Social studies as a whole have been increasing since 1889-90. Their greatest percentage gain came between 1890 and 1900, but this was almost matched between 1933-34 and 1948-49. Through 1921-22 history and government attracted 90% or more of enrollments in the field. Although this proportion dropped to 75% in 1933-34 and to 70% in 1948-49, by the latter date the total enrollments in social studies for the first time almost equalled the total high school enrollment of the entire country. Between 1890 and 1949 the number of social studies had increased fivefold, the total percentage almost fourfold. Only physical education and English could boast comparable records.

TABLE 5

ENGLISH: PERCENTAGE OF PUBLIC HIGH SCHOOL STUDENTS GRADES 9-12 ENROLLED IN ENGLISH BY TYPE OF COURSE IN CERTAIN YEARS BETWEEN 1880-90 AND 1948-40

	1000	1010	1922	1934	1949
Enrollment in 1000's	519	739	2,155	4,497	5,399
		015	2,230	5,621	
Rhetoric (1894-05)	38.5	57.1			
			78.6[1]	90.5[2]	92.9[3]
English Literature (1897-98)	42.1	57.1			
Journalism			0.1	0.7	1.9
Dramatics			0.1	0.8	1.5
Public Speaking			1.7	2.3	4.4
Penmanship			1.7	0.3	0.4
Spelling			0.7	0.4	
Literature				0.4	
World Literature					0.1
Reading				0.01	
Creative Writing and Composition				0.2	0.1
Short Story				0.01	
Novel				0.02	
Bible				0.08	0.2
Library Training				0.3	
Debate					0.3
Radio Speaking and Broadcasting					0.1
Remedial English					0.7
All other English					0.5[3]
Total Percentages	80.6	114.2	82.9	96.0	103.1
Total Subjects	2	2	7	14	15

[1] Figures and percentages for rhetoric and English literature were combined in 1921-22, but they were counted as two subjects. The percentage 78.6 was corrected to 76.7% in BS 1948-50, Ch. 5, Table 7. Since Table 7 did not contain four of the 1921-22 subjects in English, some of which might also have needed slight correction, the original percentage of 78.6 for 1921-22 was retained for the sake of consistency.

[2] Enrollments in English given separately in each of the four grades 9-12. The four courses are counted as one subject.

[3] Several subjects, not listed separately, are counted as three.

The formal study of English entered the secondary curriculum relatively late. During most of the colonial period intense and prolonged concentration on the classics provided all the knowledge of English grammar that seemed necessary. Although the development of a fine writing style and the cultivation of literary appreciation were two of the aims of grammar school education, these objectives were sought through the translation of Latin authors into English and the translation of English prose and poetry into Latin. English

grammar as a separate subject was introduced into the curricula of the evening schools that sprang up toward the latter part of the seventeenth century. The private academies of Franklin's day, and later, added courses in literature and declamation, and by 1800 courses in English grammar and literature, composition, and declamation were standard features in the secondary schools. After 1819 the colleges began to require English grammar for entrance, but it was fifty years more before English composition and literature began to receive similar recognition.[18] By that time the public high schools were spreading rapidly, and courses in English had been in their curricula from the beginning, in 1821.

Although the first reliable statistics on English enrollments were not published until 1894-95, there were earlier indications of the importance of English in the public high schools. In 1879-80 students enrolled in the English curriculum outnumbered those in the classical and modern languages curriculum more than two to one. Out of a total high school population of 110,000, 67,000 were enrolled in the English curriculum.[19] In 1886-87, the first year in which separate subject enrollments were given, 37% of the high school students were enrolled in English. A year later the percentage had jumped to 61.8, the largest for any of the eight subjects listed separately.[20] Most likely the percentage was based on enrollments in rhetoric and in English literature. Rhetoric was first listed, however, in 1894-95, and English literature in 1897-98. In the three curriculum surveys of 1905-06, 1909-10, and 1914-15 students in these two subjects, which were the only ones listed in English, were the equivalent of a little more than the total high school enrollment. Through 1905-06 registrations in English literature were slightly larger than those in rhetoric. In that year rhetoric overtook Latin for the first time and from 1909-10 through 1914-15 passed English literature by a small margin. After 1005-06 rhetoric replaced algebra as the leading high school subject, with English literature a close second.

The year 1921-22 marked a decided change in the English curriculum. The statistics for rhetoric and English literature were merged under the generic term of English. Rhetoric and English literature seemingly disappeared from the scene—some think forever. In that same year five new subjects were listed for the first time, all weak, but with public speaking and penmanship leading the five. The percentage in English, pure and undefiled, dropped slightly below its 1000 level and considerably below the level maintained between

1901-02 and 1914-15. It rose in 1927-28, dropped back slightly in 1933-34, and by 1948-49 was almost back to its 1927-28 level.

In the meantime proliferation of courses had proceeded apace. Although the number from 1933-34 on was double or nearly double the number in 1921-22, most of the newcomers were apparently offered in comparatively few of the schools. Among them, public speaking was almost as strong as the others combined. It, along with journalism and dramatics, showed some gains between 1933-34 and 1948-49. Several others made less gains during that period, were merged in statistics for others, or disappeared altogether. One noteworthy newcomer in 1948-49 was remedial English—in the opinion of many, none too soon.

Business and commercial subjects have been taught in the secondary schools of the United States ever since the latter part of the seventeenth century. The evening schools, mentioned in Chapter II, apparently started the practice, and many of the private academies included such courses in their curricula. After the Revolutionary War, industry and business expanded so rapidly that the evening schools and academies could not meet the increased demands for such training, even with the help of public high schools. In many of the larger cities, therefore, privately-owned-and-operated commercial schools and colleges sprang up. Although earlier statistics are lacking, in 1871 the Bureau of Education received reports from sixty such institutions with a total enrollment of nearly 6,500 students. By 1890 the number had increased to 250; the total enrollment was nearly 82,000. In addition, there were 25,000 other students in the private academies and colleges and in the public high schools.[11] By way of parenthesis, it is interesting to note that the number of males decreased from 96% in 1871 to 72% in 1890.[12]

The widespread demand for business education was not confined to the high schools. Many of the elementary schools offered bookkeeping in the eighth grade. The practice had become so prevalent that President Eliot of Harvard was moved to protest against it. He based his opposition on the purely practical ground that the system taught was never "used in any actual business." More than that, he argued that it would be better academically and businesswise for the young students to spend more time on arithmetic.[13]

It is not known what influence President Eliot's suggestion had on the elementary schools. More than likely it was a coincidence that the first definite information about commercial education and en-

grammar as a separate subject was introduced into the curricula of the evening schools that sprang up tnward the latter part of the seventeenth century. The private academies of Franklin's day, and later, added courses in literature and declamation, and by 1800 courses in English grammar and literature, composition, and declamation were standard features in the secondary schools. After 1819 the colleges hegan to require English grammar for entrance, hut it was fifty years more before English composition and literature hegan to receive similar recognition.[28] By that time the puhlic high schools were spreading rapidly, and courses in English had heen in their curricula from the heginning, in 1821.

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These had separate departments devoted to mechanical and industrial arts.

In the meantime some of the colleges found it expedient or necessary to organize such courses on the high school level. The first school of this type, the St. Louis Manual Training School, opened in 1880 under the auspices of Washington University. Although a few other colleges established similar schools, a movement to incorporate such training as part of the public school system was making rapid headway. One of the chief factors in this progress had been the manual training exhibits of European countries at the Philadelphia Centennial Exhibition in 1876. These exhibits had shown what could be done on elementary and secondary levels and had aroused considerable public and educational interest. In a nationwide debate which followed, there were educators on both sides and some in the middle. Proponents enumerated the mental, moral, spiritual, and economic values of such training, one by one. Their arguments could be summed up in an epigram coined by one ardent advocate: "Put the Whole Boy to School."[20]

Arguments on the opposing side could be summed up in three unepigrammatic phrases: beyond the proper functions of the public school, debasement of education, too expensive.

Even in the early stages of the debate, however, it had become obvious that the hand would join the head throughout the public school system. As early as 1880 Jamestown, N. Y., had made manual training courses obligatory, except for girls in high school.[21] In 1890, thirty-five cities reported such courses in their public school systems. 69,748 students were enrolled in them, in both elementary and high school grades.[22] Of these, 6,763 were on the high school level. Since the individual reports in many instances combined figures for all grades, the total number of students taking such courses in grades 9-12 could not be estimated with any assurance. On the basis of the figure given above, at least 3.3% of the high school students were enrolled in manual training courses in ordinary high schools. Four years later, when the data were more complete, the percentage was 6.2.[23]

The figures and percentages just given do not take into account students enrolled in public manual and industrial training high schools. They were first set up in Chicago and Baltimore, in 1884. By 1900 they had been established in at least 16 cities. The 8,696 students who received manual training instruction in them that year constituted 1.6% of the total high school enrollment. Although man-

TABLE 7

VOCATIONAL AND NONVOCATIONAL SUBJECTS: PERCENTAGE OF PUBLIC HIGH SCHOOL STUDENTS GRADES 9-12 ENROLLED IN VOCATIONAL AND NONVOCATIONAL SUBJECTS BY TYPE OF COURSE IN CERTAIN YEARS BETWEEN 1889-90 AND 1948-49

					Non-Vocational
	1910	1922	1934	1940	1949
Enrollment in 1000's	739	2,155	4,497	5,399	5,399
	915	2,230	5,621		
Industrial Arts or Manual Training	8.6	10.5	6.3		0.2*
Vocational Related Subjects			0.08	0.4	
Shop Mathematics or Industrial Arts Mathematics				0.7	0.1
Trade Science				0.4	
Diversified Occupations				0.2	
General Industrial Shop				0.07	
General Shop			1.2		8.0*
Machine Shop			0.8	0.8	
Automobile Mechanics			0.8	0.7	0.4
Mechanical Drafting				1.2	
Mechanical Drawing		2.6	6.6		5.6*
Carpentry				0.3	
Cabinet Making				0.3	
Radio				0.2	
Electrical Work			0.7	0.4	1.2
Printing		0.2	1.1	0.3	1.6
Metal Work		0.4	0.5		3.6
Sheet Metal				0.2	
Aviation				0.1	
Welding, Forge and Foundry			0.2		
Welding				0.07	
Cosmetology				0.1	
Woodworking			2.1		6.3*
Ceramics			0.03		0.1
Architectural Drafting			0.2		
Pattern Making			0.1		
Farm Shop			0.3		
Handicrafts					0.5*
Home Mechanics					0.2
Photography					0.1
Other subjects uncommonly offered				0.4	
Total Percentages	8.6	13.7	21.0	6.8	27.9
Total Subjects	2	4	15	18	13

* See Appendix E.

These had separate departments devoted to mechanical and industrial arts.

In the meantime some of the colleges found it expedient or necessary to organize such courses on the high school level. The first school of this type, the St. Louis Manual Training School, opened in 1880 under the auspices of Washington University. Although a few other colleges established similar schools, a movement to incorporate such training as part of the public school system was making rapid headway. One of the chief factors in this progress had been the manual training exhibits of European countries at the Philadelphia Centennial Exhibition in 1876. These exhibits had shown what could be done on elementary and secondary levels and had aroused considerable public and educational interest. In a nationwide debate which followed, there were educators on both sides and some in the middle. Proponents enumerated the mental, moral, spiritual, and economic values of such training, one by one. Their arguments could be summed up in an epigram coined by one ardent advocate: "Put the Whole Boy to School."[20]

Arguments on the opposing side could be summed up in three unepigrammatic phrases: beyond the proper functions of the public school, debasement of education, too expensive.

Even in the early stages of the debate, however, it had become obvious that the hand would join the head throughout the public school system. As early as 1880 Jamestown, N. Y., had made manual training courses obligatory, except for girls in high school.[21] In 1890, thirty-five cities reported such courses in their public school systems. 69,748 students were enrolled in them, in both elementary and high school grades.[22] Of these, 6,763 were on the high school level. Since the individual reports in many instances combined figures for all grades, the total number of students taking such courses in grades 9-12 could not be estimated with any assurance. On the basis of the figure given above, at least 3.3% of the high school students were enrolled in manual training courses in ordinary high schools. Four years later, when the data were more complete, the percentage was 6.2.[23]

The figures and percentages just given do not take into account students enrolled in public manual and industrial training high schools. They were first set up in Chicago and Baltimore, in 1884. By 1900 they had been established in at least 10 cities. The 8,696 students who received manual training instruction in them that year constituted 1.6% of the total high school enrollment. Although man-

ual training courses were also being offered that year in the ordinary high schools of 160 cities, enrollment figures were not available.[24]

A fairly complete and accurate statistical picture for the whole country first became clear in 1909-10. The total percentage for that year, given in Table 7 above, was based on figures for students in the two types of schools just mentioned. About 3.6% were in ordinary high schools and 5.0% in separate manual training high schools.[25]

Although the Commissioner's Reports for 1889-90 and 1899-1900, as indicated above, listed individual manual training subjects, no attempt was made to calculate separate percentages. Of the fifteen subjects listed in Table 7 for 1934, all were offered in 1890 except those dealing with automobile mechanics, electricity, and vocational related subjects. Two subjects offered in the earlier years had dropped out, at least in terminology, long before 1934: chipping and filing, and sloyd—a term for wood carving, borrowed from the Swedes. In this country it was apparently deemed very suitable for girls.

From 1909-10 through 1914-15 the separate subjects were grouped primarily under the heading: manual or industrial training. Mechanical drawing, which had been the most popular single course in the field from the beginning, was given a special listing in 1914-15 and thereafter. After 1909-10 the statistics for ordinary and manual training high schools were combined, but in 1921-22 separate listings began to re-appear and to multiply. Although the nonvocational aspects and values of manual training courses were stressed in the debate that took place between 1880 and 1900, it was 1949 before any real distinction was made in the subject matter grouping. In that year the equivalent of one-third of the high school population received training in all phases of the subject-matter field, but students in nonvocational subjects outnumbered the others four to one. Perhaps that had been something of the situation all along, particularly after 1922.

To summarize—manual training courses appeared in the high school curriculum much sooner than has been generally realized. Although subject and combined percentages through 1909-10 seem small in comparison with leading academic subject-matter fields, they were actually much larger than indicated. The lack of sufficient data made it impossible to put the picture in proper focus before 1909-10. After 1922 the subjects grouped under manual arts began to appear separately. Except for a change in terminology and the addition of a few new subjects made possible by technological progress, the subjects listed in 1934 were strikingly similar to those

offered in 1890. Subject changes that took place between 1934 and 1949 were greater than those that occurred between 1890 and 1934.

TABLE 8[1]

HOME ECONOMICS: PERCENTAGE OF PUBLIC HIGH SCHOOL STUDENTS GRADES 9-12 ENROLLED IN HOME ECONOMICS BY TYPE OF COURSE IN CERTAIN YEARS BETWEEN 1889-90 AND 1948-49

	1910	1922	1934	1949
Enrollment in 1000's	739	2,155	4,497	5,399
	915	2,230	5,621	
Home Economics	3.8	14.3	7.9	
Sewing			1.9	
Cooking			1.3	
Child Care			0.1	0.2
Home Nursing			0.2	0.8
Foods (nutrition and dietetics)			2.3	2.9
Clothing			2.7	3.8
Family relations			0.1	0.5
Interior Decorating and House Planning			0.1	0.1
Costume Design or related arts			0.1	0.1
Homemaking				14.3
Homemaking General				0.8
Home Management				0.8
Consumer Buying[2]				
Total Percentages	3.8	14.3	16.7	24.3
Total Subjects	2	4	10	10

[1] Between 1934 and 1949 several changes in course names were made. Those not indicated in the table or text were as follows: *Home Nursing* in 1934 added *health* in 1949; *interior decorating and house planning* became *the house* in 1949.

[2] Listed under Social Studies, Table 4.

Household work or domestic economy entered the high school curriculum in the early 1889's along with other manual trainiag subjects. This was only natural siace cooking and sewing, the forms in which it first appeared, were considered manual arts.[32] Of the 35 cities that offered manual traiaing ia tbeir public school systems in 1889-99, 16 gave courses in sewiag and 12 in cooking. (Sec note 32 on p. 55). In 1893-94, of 95 such cities, 43 gave courses in sewing, 26 in cooking.[33] By 1999 the number of such cities had increased to 199, but information about work in sewiag and cooking, or any other separate subjects, was not made available. In that year, however, of the 16 separate public manual training high schools listed, 11 offered courses in sewing and 19 in cooking. (Sec Note 34).

As was true of manual traiaing subjects, the situation ia domestic

economy remained very much confused until 1909-10. In that year the number of ordinary high schools reporting domestic economy had increased to 491; only 257 reported manual training courses. The students in domestic economy constituted 3.8% of the total high school enrollment, as against 3.6% for those in manual training.[38] In addition, however, there were 10,189 girls enrolled in 59 public manual training high schools throughout the country.[39] Although many of these were undoubtedly taking courses in domestic economy, in addition to the other subjects just mentioned above, the exact number could not be determined.

In 1922 the real situation in domestic economy, now changed to home economics, came to light. With the figures in both types of schools combined, home economics pulled slightly ahead of manual training. It fell behind in 1934, but was catching up by 1949.

In 1934 it was possible to see in some detail for the first time the range of efforts being made to promote the domestic felicities of modern living. Home economics, that reassuring catchall, remained in the lead as befitted a basic course. Sewing and cooking, as some might have feared, yielded to the more tangible objects of their affections, clothing and foods. These two increased in 1949, with three year-courses in each. Cooking and sewing lost their separate identities by being subsumed under homemaking. This was not a newcomer to the field but another name for the basic course. It was divided into four year-courses and commanded nearly 60% of all registrations in home economics.[40]

Throughout our history farming bas been the backbone of our economic life. Yet instruction in the elements of agriculture has played a very minor role in secondary education. Tbis is all the more strange when it is realized that agricultural societies to promote such studies at all levels were formed a few years before 1800. Although they did not succeed in establishing courses of instruction in the high schools, they did stimulate publication of books and periodicals dealing with agriculture, and the organization of agricultural fairs. Both of these activities had some educational influence.

In the early part of the nineteenth century a few private agricultural schools were organized and some of the universities introduced courses in agriculture and horticulture. Three states founded agricultural colleges hetween 1857 and 1859, but colleges of this kind did not hegin to increase until the Morrill Act of 1862 gave federal aid and impetus to the movement. In that same year the Department of

TABLE 9

AGRICULTURE: PERCENTAGE OF PUBLIC HIGH SCHOOL STUDENTS GRADES 9-12 ENROLLED IN AGRICULTURE BY TYPE OF COURSE IN CERTAIN YEARS BETWEEN 1889-90 AND 1948-49

	1910	1922	1934	1949
Enrollment in 1000's	739	2,155	4,497	5,899
	915	2,230	5,621	
Agriculture	4.7	5.1	2.9	6.7
Animal Husbandry			0.3	
Horticulture			0.1	
Soils and crops			0.3	
Poultry			0.02	
Total Percentages	4.7	5.1	3.6	6.7
Total Subjects	1	2	5	4

Agriculture, which had existed in embryo as a minor division of the Patent Office, was given independent and national status.[a]

The nctivities of the colleges and of the new Department in giving extension courses nnd in holding institutes for farmers possihly helped to delay the introduction of agricultural courscs in the puhlic high schools. Some of the ngricultural colleges had such courses on the high school level, nnd interest in them began to grow. By 1905 n few private nnd public schools were teaching elcmentary courses in the subject and thrcc normnl schools in at least one state were heginning to train teachers of such subjects for the public schools in that state.[a]

But not until 1910 did the high school study of agriculturc cut nny sort of national furrow. By 1915 the furrow had bccomc a bit longer and dceper; the number of schools reporting agriculturc had increased from ncarly 1,800 to 4,390, and the pcrccntagc of studcnts had almost doublcd. In 1917 the national govcrnment stepped in with the Smith-Hughes Bill to nssist the states in cstablishing vocational high schools. In 1922, however, although the number of schools reporting had increased to 5,200, tbc national pcrccntage, like nn ornery mule, took two steps backwnrd from its position of 1915. Thc future farmers of Americn suffered a slight setback and the cattlc on a thousand hills moaned low.[a]

In 1934 agricultural courscs were listed nnder separatc subjects for the first timc. The previous pattern, however, was reinstated in 1949, except that cnrollmcnts were given in each of the four years into which the courses had been organized. Most likely the courses covered essentially thc different subjects listed in 1934.

Since agricultural courses have only sectional appeal and are offered more widely in some regions of the country than in others, the national percentages may be misleading. In 1910, for example, when such information was given, the percentage of students studying agriculture in the North Atlantic and in the Western Divisions was 1.15 and 1.16 respectively. The greatest concentrations were in the South Atlantic and South Central Divisions, with 11.6% and 16.22 respectively. The North Central Division trailed along with 5.03%. In 1915 the sectional percentages had changed very little, and there is no reason to believe they have changed materially since.

TABLE 10

PHYSICAL EDUCATION: PERCENTAGE OF PUBLIC HIGH SCHOOL STUDENTS GRADES 9-12 ENROLLED IN PHYSICAL EDUCATION BY TYPE OF COURSE IN CERTAIN YEARS BETWEEN 1669-00 AND 1948-49

	1900	1910	1922	1934	1949
Enrollment in 1000's	519	739	2,155	4,497	5,399
Physical Education		915	2,280	5,621	
Health			5.7	50.7	69.4
Hygiene and Sanitation					26.7*
Safety			6.1	6.5	4.5*
Driver Education					3.4*
Military Drill					3.6
Total Percentage	2.0		2.7	1.2	1.5
Total Subjects	2.0		14.5	58.4	109.1
	1		3	3	6

*See Appendix E.

Our colonial ancestors paid more attention to the mind than to the body. Despite their devotion to the literature and thought of Greece and Rome as food for the mind, they gave no heed to ancient ideas about the values of physical training as a part of education. This was perhaps natural in a country where distances were great and means of travel limited. The daily life of children, whether those of a farmer, tradesman, or clergyman, involved considerable exercise and play in many forms outside of school hours. This was considered sufficient for growing bodies, if indeed any thought was given to the matter at all.

But growing urbanization and higher standards of living began to have some effect. Around 1850 unhealthy conditions in schools finally caused severe criticism and during the next 50 years the neces-

sity for physical culture, as it was then called, and for instruction in health and hygiene was gradually recognized. But progress was slow. In 1886-87, out of 419 high schools supported wholly by public funds, 90 reported equipment for physical culture.[44] In 1889-90 only 91 out of 2,526 high schools reporting had gymasiums.[45]

In that year Boston appointed a director of physical training for its public schools. This was possibly the first position of its kind in the country.[46] In January 1891, about 1,100 teachers "were engaged in an honest attempt to teach the Ling free standing movements" in Boston's grammar and primary schools. 190 or more of these teachers had attended the Boston Normal School of Gymnastics, which had been founded in 1888.[47]

The major emphasis in Boston, and elsewhere during this period, was on physical training in the elementary grades. But the movement was growing and spreading upward into high school. In 1899-1900 military drill was given in 132 high schools, including three in Indian Territory, in 33 states and the District of Columbia. A total of 10,259 boys took part in the drills, or 4.7% of the male high school enrollment.[48] Nearly half of these were in Massachusetts; over half were in four New England states, where nearly one-third of the high schools reporting military drill were located.

Encouraging signs of progress could be seen by 1910. In that year 5% of the high schools had departments of physical education; 8% gave instruction in gymnastics, 10% in athletics, and 16% in hygiene. 20% of the schools had athletic fields, 7% gymnasiums, 1% military drill.[49]

Experience during the first world war brought out the great need for a better and more widespread system of physical education in the public schools. In 1915 the U. S. Army rejected 80% of those who volunteered; the Navy, 75%, and the Marine Corps, 83%. The rejections were based on physical disabilities of various kinds. It was estimated that 50% of the disabilities recorded by the Navy, and 40% of those recorded by the Marine Corps could have been prevented or corrected by proper remedial measures in childhood.[50]

Although the responsibility of the high schools for such a large percentage of rejectees could not be determined, it was estimated that not more than 50% of public high school graduates could have met the physical standards set by the Army and Navy. The shock of these revelations was immediate but shortlived. The shortcomings of one proposal, compulsory military training for high school students, which was adopted in a few states, soon became obvious. A more

comprehensive system of physical training, combined with instruction in health and hygiene, was needed, but it was slow in coming. In 1921-22 only 356 high schools out of about 14,000 reported physical training; 319 reported military drill; 1,652, courses in health and sanitation. The number of students involved was the equivalent of only 14.5% of the total high school enrollment. Boys outnumbered girls by not more than the width of a pair of bloomers.[57]

The greatest progress came between 1927-28 and 1933-34. The percentage of students in physical education jumped from 15 to almost 51. In the latter year, however, nearly half of the public high schools reported no such training. In hygiene and sanitation the situation was much worse. Only a little over one-sixth of the high schools had these subjects in their curricula. Military drill, as might have been expected, diminished to the size of a button on a platoon captain's coat.[58]

World War II revealed continued deficiencies in the high school program of physical training and education. As a result, many states made physical training compulsory and instituted new courses in health. Although many students in 1948-49 were not receiving instruction in the basic elements of physical education, health, and safety, the total number involved in all courses was for the first time equivalent to a little more than the total high school population. Physical education had become the second leading subject matter field in the high school curriculum.

Those twin handmaidens, music and art, had no part in the academic pattern of colonial times. The religious clime forbade the making of a "joyful noise unto the Lord" in church, and academic discipline had no thought for its possible need or use in school. The concept, *vita brevis*, was a theme for constant admonition and frequent practice. *Ars Longa* was only another Latin phrase to be memorized without regard for any practical application.

The notion of music and art as educational instruments entered our public school system via Boston. The introduction of art, in the form of drawing, came in 1821. The attempt was not very successful there nor in the few other cities where it had been tried by 1850. Real impetus was given to the movement by the realization, gained by American visitors to the London Exhibition in 1851, of the industrial purposes which art might serve. In 1860, drawing was made optional in the schools of Massachusetts, and a required subject in the high schools, in 1864. In 1868 the requirement was extended to several

grades below the high school level. Two years later the teaching of drawing was made compulsory for all public schools, and all towns of 10,000 or more inhabitants were required to give free instruction in industrial or mechanical drawing to persons over fifteen years of age. During that same year, 1870, the position of state supervisor of drawing and art was set up, probably the first of its kind in the country. In 1874 the Massachusetts Normal Art School opened, the first state supported school of its kind in the country. Its specific purpose was to train public school teachers of drawing and art.[53]

TABLE 11

MUSIC: PERCENTAGE OF PUBLIC HIGH SCHOOL STUDENTS GRADES 9-12 ENROLLED IN MUSIC BY TYPE OF COURSE IN CERTAIN YEARS BETWEEN 1889-90 AND 1949-49

	1922	1934		1949*
	2,155	4,497		5,399
	2,230	5,621		
Vocal Music (1914-15)	21.9	17.9		
Instrumental Music (1914-15)	6.2	8.2	0.2	0.3
Music Appreciation or Studies (1914-15)	0.2	1.2	4.1	6.3
Orchestra		1.2	1.6	2.4
Band		1.3	6.2	9.4
Chorus			8.4	12.9
Glee Club			6.1	9.3
General or Public School Music			2.9	4.5
Theory and Practice			0.1	0.2
Harmony			0.5	0.7
Total Percentage	25.3	24.6	30.1	46.0
Total Subjects	3	5	9	9

*The first column under 1949 gives corrected percentages. See Appendix E.

At the Centennial Exhibition held at Philadelphia in 1876 the special exhibits of art work done in schools attracted favorable attention and created a new wave of enthusiasm among laymen and educators alike. By 1886-87 a shade over one-fourth of the students in city public high schools were enrolled in free-hand drawing. The students represented 375 schools, out of a total of 419 that reported, located in 25 states and the District of Columbia.[54] Although detailed statistics for 1889-90 were not given, approximately half of the 2,500 public high schools that reported had made drawing compulsory.[55] The type of drawing, whether free-hand or mechanical, was not specified. In another table for manual training in city public schools, how-

TABLE 12

ART: PERCENTAGE OF PUBLIC HIGH SCHOOL STUDENTS GRADES 9-12 ENROLLED IN ART BY TYPE OF COURSE IN CERTAIN YEARS BETWEEN 1889-90 AND 1948-49

	1922	1934	1949*	
Enrollment in 1000's	2,155	4,497	5,399	
	2,230	5,621		
Freehand Drawing (1914-15)	14.7	5.5	2.6	7.1
Art-Craft-Design		2.7	0.4	1.0
Art Appreciation		0.2	2.5	6.9
Applied Art		0.1	0.8	2.1
Commercial Art		0.1	0.3	0.7
General Art			1.8	4.7
School Service Art			0.6	1.7
Total Percentage	14.7	8.6	9.0	24.2
Total Subjects	1	5	7	7

*The first column under 1949 gives corrected percentages; the second, original percentages. See Appendix E.

ever, there were entries for drawing, free-hand drawing, and mechanical drawing.[56] But despite the confusion in terminology and the lack of definite and accurate information about it, art instruction in all public schools was a matter of increasing concern. Almost every Commissioner's Report between 1870 and 1900 had many references to and comments about the general problem.

The same was true of music. Its development paralleled very closely that of art. It too started in Boston. After an auspicious beginning about 1836, there was an almost immediate diminuendo. The idea spread slowly throughout New England and the rest of the country. On the elementary school level there is some evidence that singing, the form in which instruction was first given, was connected with physical training. It was considered most useful for strengthening the lungs and for developing the speaking voice.[57]

There is little doubt that the teaching of music spread more rapidly than the teaching of art. A special survey made by the Bureau of Education in 1885 showed that seven-eighths of all public school pupils were receiving instruction in music that year. The following year it was reported that it was "systematically taught in nearly every city school in the country."[58]

The encouraging information contained in the survey may partially explain why no attempt was made to collect similar data for many

years. The Bureau's statistical staff was small, and music, together with art, was in a rather special category. Neither music nor art was required for college entrance; strictly speaking, neither was vocational in nature. The cultivation of both had apparently been widely accepted as legitimate public school functions.

How well were the schools doing the job? Not well at all in music, was the verdict of a special commission that had come over from England to study American education. It found n great "neglect of musical talent among the school children."[79] It also felt that drawing should not he considered a manual training subject, and that its teacb-ing methods were undeveloped.[80]

Wbat effects this report bad on tbe teacbing of music and art in tbe puhlic schools is not known. It can scarcely he disputed, bowever, that instruction in these two fields did not keep pace with the expanding higb scbool population. In 1904-05, out of 188 cities with a population of more than 25,000 that reported to the Bureau of Education, 142 had supervisors of music in their public school systems, and 156, supervisors of art.[81] Tbe number of students could not be estimated.

Tbe first definite information ahout high school enrollments in music and art was reported for the session of 1914-15. In tbat year 31.5% of tbe total bigb school enrollment received instruction in vocal music in 3,520 bigb scbools; 22.9% received instruction in drawing, in 3,090 higb schools.[82] These were tbe largest percentages reported for any year in these two suhject matter fields. Because of its possihilities for various kinds of group activities, music bad naturally crescendoed more than art by 1914-15. Since then the gap hetween the two has widened considerably. It reached a three-to-one scale in 1933-34 and has grown sligbtly larger since.

The greatest changes in music came between 1934 and 1949. By the former year hands and orchestras had made a formal entry, with the hrass only slightly in the lead. By 1949 the strings had stepped up their volume sligbtly, hut the wind and percussion instruments even more. Music appreciation, which was struggling for recognition in 1922, merged with music studies in 1934 but had regained independence of movement hy 1949. Among the new alignments in 1949, chorus took a commanding lead in vocal music, with strong support from glee cluh activities. Public school music, aided hy harmony, theory and practice, sounded a timid, professional note, but thc whole high school ensemble was decidedly on the up beat.

Art has shown tbc opposite trend. In thc simple, unsophisticated days of 1915 and 1922, students could give vent to their artistic feel-

ings only in drawing. By 1934 this was not considered a sufficient outlet, and several courses were added to afford fuller expression. The result, numerically if not artistically, was a decided drop in total percentage.[63] Drawing still maintained a two-to-one popularity but barely managed to hold first place over art appreciation in 1949. Third place went to general art, one of the two new courses that year. The other was school service art, so called because students who wished to do so might work at school-wide projects, in which service was possibly more important than art. Despite the two added courses, the total percentage for 1949 was greater than that for 1934 only by the thickness of a painter's pallette.

TABLE 13

TEACHER TRAINING: PERCENTAGE OF PUBLIC HIGH SCHOOL STUDENTS GRADES 9-12 ENROLLED IN TEACHER TRAINING BY TYPE OF COURSE IN CERTAIN YEARS BETWEEN 1889-90 AND 1948-40

	1900[1]	1910[2]	1922	1934	1949
Enrollment in 1000's	519	739	2,155	4,497	5,399
		915	2,230	5,621	
Teacher Training or Principles of Teaching	2.6	1.9	0.9	0.1	0.002
Normal Review			0.1		
Total Percentage	2.6	1.9	1.0	0.1	0.002
Total Subjects	1	1	2	1	1

[1] CR 1899-1900, II, p. 2087.
[2] CR 1909-10, II, p. 1096. References for the other years are found in Appendix B.

Teacher training in the United States first started in the private academies, which began to spring up after 1750. They apparently did not introduce special courses for that purpose, however, until well after 1800. A pioneer step in that direction was taken by the Lancastrian Schools, many of which were founded in this country between 1815 and 1830. The use of older students as monitors, under the general supervision of the headmaster or teacher, involved practical application of rote teaching methods. Although the system was neither very successful nor lasting, it did show the necessity for developing methods of group instruction, and stimulated interest in free public schools.[64]

The influence of the academies on the development of teacher train-

ing was twofold: their lead in introducing teacher-training courses was followed by the early puhlic high schools, and they hecame the model for the first teacher-training school in America, estahlished in 1823, in Concord, Vermont, hy the Reverend Samuel R. Hall.[65] Although the new school's curriculum was largely academic, the three-year course also included a review of elementary school suhjects, and provided opportunity for ohservation of teaching and for practice teaching. Toward the end of the three-year course, students were given a special series of lectures on "The Art of Teaching." After six years of experience the founder of the school set forth his principles in a volume, *Lectures On Schoolkeeping,* puhlished in 1829. This was the first professional work of its kind written and puhlished by a native American.[66] It was widely sold and read, and influenced writing on educational matters for many years.

The success of Hall's school strengthened the hands of those who advocated state estahlishment and support of teacher training schools. Massachusetts again led the way, and in 1839 the first state normal school in the country opened in Lexington.[67] The idea of puhlic normal schools spread slowly until ahout 1870. By that date many states had one or more of such schools, and some of the larger cities had incorporated them in their puhlic school systems. In 1900 the Bureau of Education received reports from 172 puhlic normal schools and teachers colleges, and 134 under private control. In addition, 243 universities and colleges reported departments of education or professional courses in that subject matter field.[68] Only one state reported no puhlic normal school or no state university offering such training.

By 1900 most normal schools had begun to raise their entrance requirements from elementary to high school graduation. The leading subjects in the typical normal school of this period included the "history of education, the theory of education, school oragnization and supervision, school management and discipline, school hygiene, psychology and child study, ethics, school laws, and practical pedagogy."[69]

In 1870 the typical normal school included four years of high school work in its offerings. Its purpose was the same as that in 1900, namely, to prepare teachers for the elementary schools. At a meeting of the American Normal School Association in 1870, a special committee recommended for elementary teachers the course of study and training listed on the next page. The course was to take two years, and each year was divided into two terms of 20 weeks each.[70]

Subject	*Number of weeks*	*Order*
English (grammar, reading, elocution)	60	Omitted 4th term
Arithmetic (through ratio and proportion, roots, mental processes)	40	1st yr.
Algebra (to quadratic equations)	10	2nd yr., 1st term
Geometry (4 hooks)	40	1st yr., 2nd term
		2nd yr., 2nd term
Writing and drawing (free)	20	1st yr., 1st term
Drawing (Perspective. Drawing of simple objects)	20	1st yr., 2nd term
Geography (U. S., Europe, Asia, world map construction, methods of rapid delineation, phenomena of ocean and atmosphere, terrestrial astronomy)	60	Omitted 4th term
Botany (Morphology of leaves; stem; roots, analysis and classification of plants)	16-18	1st year
Physiology	32	1st yr., 1st term
		2nd yr., 2nd term
Natural philosophy (Physics)	20	2nd yr., 1st term
Geology (General principles, field work, classification of specimens)	20	2nd yr., 2nd term
Chemistry (Nomenclature, study of elements and compounds, lectures and laboratory)	30	2nd year
Vocal and physical training (Free calisthenic exercises; musical notation and reading through key of *C*; chorus)	20	1st yr., 1st term
Vocal and physical culture (Reading and singing in all scales and keys; transposition; chorus; rhythmic exercises)	20	1st yr., 2nd term
History (American)	20	2nd yr., 1st term
Science of government	20	2nd yr., 1st term
Bookkeeping (Theory and practice in double entry and in business forms)	20	1st yr., 2nd term
Theory and practice of teaching (Observation and criticism of teaching primary reading and number classes)	20	1st yr., 1st term
Theory and practice of teaching (Lessons and criticism of methods in language, form ,and place)	20	1st yr., 2nd term
Theory and practice of teaching (Practice and criticism of object lessons; management and methods with advanced classes)	20	2nd yr., 1st term
Theory and practice of teaching (School organization, discipline, and management; school laws; history of education)	20	2nd yr., 2nd term
Ethical instruction (Manners and morals; foundation of right habits)	20	1st yr., 1st term
Philosophy of education, including mental philosophy (Nervous mechanism; the senses; sensation, perception, observation, memory, reason, imagination; principles and methods of training inferred from the above)	20	2nd yr., 2nd term

With its report the committee gave some statistics on the teacher training situation throughout the U. S. at the time. Out of 200,000 public school teachers, it was estimated that 40% were without previous experience. If all the students in all the schools for training teachers, both public and private, became teachers, seven out of eight of the inexperienced teachers would still be without special training for their work. The committee also expressed the opinion that "one of the best methods of teaching how to teach any subject is actually to teach that subject upon the most approved plan." But that method should not be "exclusively relied upon. Special drill in the art of teaching should be constant accompaniment of the course."

To what extent the proposed curriculum was adopted by the normal schools or adapted by the public high schools could not be determined. In 1886-87 there were 50,000 students training to become teachers in the four different types of institutions that reported to the Bureau of Education. About 90% of these were in public and private normal schools. Of the remainder, students in the normal course in public and semi-public high schools outnumbered teachers-in-training in 58 reporting colleges a shade under two-to-one.[1] The public school students taking the normal course constituted 3.7% of the total high school enrollment reported that year. Most of the schools were in city systems.

The rapid growth of the public high schools after 1870 enabled the normal schools to raise their entrance requirements gradually and in time to drop their high school departments altogether. By 1900, as pointed out above, they were concentrating on professional courses in education. The high schools, on the other hand, in response to the increasing demand for teacher training, had introduced normal courses into their curricula. Although no information was given in 1870, and none could be found later about the names and contents of such courses, one thing does seem fairly certain: The increase in the number and standards of the normal schools was instrumental in raising the requirements for the granting of teachers' certificates. This, in turn, decreased the need and the practicality of teacher-training courses in the public high schools.

[1] BS 1948-50, Ch. 5, p. 6. A course is one year's study of a subject. A subject such as English, for example, is usually divided into four courses of a year each.

[2] No curriculum survey was made between 1933-34 and 1948-49. The next one is scheduled for 1958-59.

[3] The explanation for two different figures in 1910, 1922, and 1934 is given in Appendix G, Table S6, Notes 2-4.

[4] The total number of subjects will be discussed as necessary in connection with each table.

[5] CR 1887-88, Table 38, p. 490. The equivalent of 86 percent of the students in high schools supported wholly by public funds, that reported to the U.S. Bureau of Education, were enrolled in mathematics courses. Other sources for the colonial period and later include: *Kandel*, pp. 122, 169-77, 397-462; *Knight* (1): 122-8, 375-76, 427-31; *Johnson*, 133, 147, 301-17; *Brown*, 131-35, 231-32, 237-47, 300-03, 371, 417, 425; *Meriwether*, 158-81; *Cubberley*, 26-81, 288-339.

[6] *Bul. 1938, No. 6*, p. 12; *BS* 1948-50, Ch. 5, p. 15. A break-down of this type was not possible before 1927-28. In that year 27% of the total high school enrollment was in elementary algebra (*BS* 1926-28, p.966), which constituted a little more than 72% of grade 9.

[7] BS 1926-28, p. 966.

[8] *Ibid.*, p. 1064.

[9] BS 1948-50, Ch 5, p. 16, Note 10. See Note 3 of Table 1 above. The contents of the elementary course apparently represent "a final attempt to pound home the basic operations of arithmetic." See *Dyer et al*, p. 22.

[10] CR 1909-10, II, Table A., p. 1139. The figures and percentages for plane and solid geometry, as usual, were combined. These percentages show that trigonometry was not "at an all-time high" in 1048-49, as stated in BS 1948-50, Ch. 5, p. 16.

[11] This comparison was made between the data in this table and those in CR 1909-10, Table A, p. 1139. For the relationship of mathematics to all other subject-matter fields throughout this entire period, see CH. V, Table 14. By the fall of 1052 the percentage of students in algebra had dropped to 24.6; in geometry, to 11.6; in trigonometry, to 1.7; but in general mathematics it had risen to 15.0 The total percentage was 52.9 See *Bulletin 1953, No. 5*, Table 49. In the fall of 1954 algebra had a slight increase to 24.8% and trigonometry a striking increase, to 2.6. The reference for these percentages, *Pamphlet No. 118, 1956*, Table 11, shows a slight decrease for geometry, to 11.4. The writer, however, using the data in *School Life* (May 1055), p. 126, and (June 1956), p. 6, calculated the percentage for geometry as 11.7. He also calculated 12.2 for general mathematics, which was not covered in the pamphlet. Another special study by the Office of Education for the fall of 1056 showed 28.7% for algebra; 13.6 for geometry, and 2.9 for trigonometry. These figures were given to the writer in advance of publication by Dr. Kenneth E. Brown, who conducted the study. They are to be found in *Pamphlet No. 120, 1957*, Table 16.

[12] CR 1886-87, Tables 31 and 33, pp. 496, 512. The statistics were based primarily on reports from public high schools in city systems. See Ch. II, notes 2 and 4.

[13] *Brown*, p. 248; *Cubberley*, p. 315.

[14] In 1954-55 the percentage for Latin was 6.9; for French, 5.6; for Spanish, 7.3; for German, 0.8. See *PMLA*, LXX, No. 4, Pt. 2 (September 1955), pp. 52-56.

[15] CR 1887-88, p. 490.

[16] In the fall of 1954 enrollments in physics and chemistry constituted 4.6% and 7.3%, respectively, of the total high school enrollment; biology, 19.6%. See *Pamphlet No. 118, 1956*, Table 2. No statistics were reported on general science. If it increased proportionately as much as biology its percentage would have been 22.2 This estimate, as it happens, was probably somewhat high. In the fall of 1956 its percentage was 21.8; biology, 20.5; chemistry, 7.5. Physics alone had a slight decrease to 4.4. These figures are to be found in *Pamphlet No. 120 1957*, Table 3.

[17] In BS 1948-50, Ch. 5, Table 3, enrollments in civics are given for grades 7, 8, or 9. It was estimated, however, that one-third of the ninth grade students were enrolled in the subject. (*Ibid.* p. 9). On the basis of enrollments in ninth grade English, 9.5% is approximately correct. The same percentage also studied American history in the ninth grade.

[18] *Kandel*, pp. 363-64; *Knight* (1), p. 375; *Brown*, pp. 231-32, 371; *Cubberley*, p. 315.

[19] CR 1880, Table VI, pp. cvi-cvii. [20] See Notes 12 and 5 above.

[21] CR 1889-90, II, p. 1610. Statistics for all types of schools were combined. For the period before 1889-90, see CR 1892-93, II, p. 2020.

[22] CR 1892-93, II, p. 2020.

[23] CR 1889-90 (published in 1893) II, pp. 1126-27. The remarks were made in an address to the National Education Association on February 16, 1892.

[24] CR 1893-94, I, p. 65; II, p. 2171. The first reference gives the total high school enrollment, the second, subject registrations.

[25] CR 1899-1900, II, pp. 2478-79.

[26] *Ibid.* pp. 2469, 2474.

[27] CR 1904-05, II, pp. 815 (enrollment), 1226-27 (subject registrations).

[28] CR 1909-10, II, pp. 1249, 1258.

[29] *Dexter*, p. 408. Between 1775 and 1835 a "manual labor movement" made considerable headway in the country. Many colleges, academies, and theological schools combined such a feature with their academic work, but the movement collapsed from practical difficulties of finance and administration. Undoubtedly its influence, however, helped to prepare the way for the Morrill Act. See *Knight* (1) pp. 380-84.

[30] It was made in an address by C. M. Woodward, Director of the Manual Training School of Washington University, in Boston, on December 16, 1885. The address was published in the *Boston Herald* of December 17, 1885, and in pamphlet form by the Social Science Association of Philadelphia, in 1886. This information was given in a special article by Woodward, "The Rise and Progress of Manual Training," (CR 1893-93, I, pp. 895-96). The whole chapter, pp. 877-949, surveyed the development of the manual training movement in this country and in Europe, including Russia, down to 1893-94. Unless otherwise indicated, it is the primary source for the statements made in this section.

[31] CR 1893-94, II, Table 20, p. 2095. This was the earliest instance found of such courses, obligatory or otherwise, in the public school system of any American city.

[32] CR 1889-90, II, pp. 1351-56. The table gives 35 as the number of cities, but Washington, D. C. was listed twice. In CR 1899-1900, II, p. 2438, and in CR 1904-05, II, p. 1168, the number of cities for 1890 is given as 37.

[33] CR 1893-94, II, Table 20, pp. 2097-2113. The percentage is minimal. As in 1889-90, in many cases figures for all grades were combined.

[34] CR 1899-1900, II, Ch. 40, Tables 1 and 4. The writer made the additions and calculated the percentage given. The figure 169 did not include cities in which instruction in mechanical drawing was given.

[35] CR 1909-10, II, Ch. 26, Tables 161 and 163. Both percentages are minimal. The figures in Table 161 were from 257 high schools in nearly all of the 48 states. No school was included that did not report at least 20 students in manual training courses. The writer made the additions from the list of schools given in Table 163, and calculated both percentages.

[36] The introductory remarks about manual training in the preceding section are generally applicable to domestic economy.

[37] CR 1893-94, II, pp. 2097-2113.

[38] CR 1009-10, II, Table 137 (domestic economy), Table 161 (Manual training). The percentage of 3.8 in Table 8 above represents 27,933 students. Of these 1,546 were boys. The percentage of 3.6 in Table 7 above represents 26,637 students. Of these 9,803 were girls, most of whom were probably taking mechanical drawing, clay modeling, and wood carving. See Note 35 above.

[39] *Ibid.* Table 168, Pt. 1.

[40] BS 1948-50, Ch. 5, p. 23, and Table 3. This was the first year such a division appeared for home economics. In *Bul. 1938, No. 6,* Table 3, the division into years was made for English, foreign languages, and mathematics, but a large number of students had to be placed in an "undesignated" category for lack of more specific information or designation by the reporting schools.

[41] CR 1904-05, I, pp. 244-48.

[42] CR 1904-05, I, pp. 251-53.

[43] *Time,* (August 8, 1955) carried the welcome news that the "national F.F.A. program" had made tremendous strides since the disheartening days of 1922. That organization was not in existence then, but one hopes that some agronomic license may be allowed in such terrestrial matters.

[44] CR 1886-87, pp. 534-43. Most of these schools were in city systems. The writer made the count.

[45] CR 1889-90, II, pp. 1394-1485. The writer made the count.

[46] *Ibid.,* pp. 1106-08. This could not be verified. In the winter and spring of 1890 a Boston School Committee made an extensive tour to observe systems of physical training in the public schools of the West and South. Their administrative organization for physical training was not covered in the reference cited.

[47] *Ibid.* The Ling system was built on a series of rhythmic movements, all starting from one basic position. There were ten types of exercises. See *Ibid.,* pp. 1103-06 for an account of Ling and his system.

[48] CR 1899-1900, II, pp. 2174-2350. The writer made the count and calculated the percentage.

[49] CR 1909-10, I, pp. 138-47. No estimate could be made of enrollments.

[50] CR 1915-16, I, pp. 517-19.

[51] BS 1920-22, II, pp. 596, 573, 590. In 1914-15 military drill was reported in only 119 schools. A little over 50% of the boys in those schools engaged in the drills—1.2% of the total high school enrollment. CR 1915-16, II, p. 477.

[52] BS 1926-28, pp. 1085, 1069; *Bulletin 1938, No. 6,* Tables 2 and 3.

[53] CR 1870, p. 167; *Cubberley,* pp. 355, 428-29, 467-69.

[54] CR 1886-87, pp. 496-97. Mechanical drawing enrolled 8.8%.

[55] CR 1889-90, II, pp. 1394-1485. The writer made the count.

[56] See Note 34 above.

[57] CR 1870, p. 167; CR 1886-87, pp. 237-38. For a brief account of its beginning in Boston, and its development elsewhere in the country, see CR 1899-1900, I, pp. 349-55. See also *Cubberley,* pp. 355-56, 428.

[58] CR 1886-87, p. 237; *Circulars of Information of the U. S. Bureau of Education,* No. 1, 1886, pp. 41-78. See *Dexter,* p. 406. According to Dexter (p. 407) the proportion was even greater in 1901. The number of high school students in music could not be estimated for 1885-86 or for 1886-87. Most likely the great majority were in the lower grades.

[59] From "Extracts From the Report of the Mosely Educational Commission to the United States of America, October-December 1903," in CR 1904-05, I, p. 15. In a short, introductory article, W. T. Harris (*Ibid.* pp. 1-10), stated that the purpose of the Commission was "to find out the educational causes and conditions which have contributed to the rapid industrial development of the United States," and recommended it to the careful attention of American readers. The survey covered the whole range of education, public and private, academic and technical, at all levels, and was published in a 400-page book by the Cooperative Printing Society (Limited): London, 1904.

[60] *Ibd.*, p. 23.

[61] *Ibid.*, pp. 217-23.

[62] CR 1915-16, II, pp. 499 and 503. In 1909 the Music Teachers' National Association held its 31st annual meeting (no previous mention of this organization was found), and in 1910 the American Federation of Arts held its first annual convention. CR 1909-10, I, pp. 121 and 54 respectively.

[63] The percentage for drawing in 1922 may have been based on some enrollments in mechanical drawing. The statistics in *Bul. 1938, No. 6,* Tables 1 and 2, did include mechanical drawing under the entry, "Drawing and art." Since separate data for the subject were given, however, in Table 3, it was listed with the vocational and nonvocational subjects in Table 7 of this study.

[64] For brief accounts of Joseph Lancaster, the English schoolmaster, see *Cubberley,* pp. 128-37; *Knight* (1), pp. 66, 163-67. See also *Brown,* pp. 250-51.

[65] *Cubberley,* pp. 375-76; *Knight* (1), pp. 309-29.

[66] Three other books had actually preceded it, all published in Philadelphia. The first, *Schulordnung,* was written in German by Christopher Dock, in 1750, but not published until 1770. In 1808, Joseph Neef, a former associate of Pestalozzi in Switzerland, published a *Sketch of a Plan and Method of Education, founded on the Analysis of the Human Faculties and Natural Reason.* In 1813, Neef published his *Method of Instructing Children Rationally in the Arts of Writing and Reading.* Although none of these three had much more than local circulation, Neef made his books known in Louisville, Kentucky and in New Harmony, Indiana, where he taught. See *Cubberley,* p. 325, Note 1.

[67] *Cubberley,* pp. 378-84.

[68] CR 1899-1900, II, Ch. 38, pp. 2067-2117. New York University was probably the first to offer such courses, in 1852. See *Knight* (1), p. 334.

[69] *Knight* (1), p. 329.

[70] CR 1870, pp. 404-05. The meeting was held in Cleveland, August 15, 1870. The committee's whole report was published in pp. 399-405.

[71] CR 1886-87, p. 455. The public high schools outnumbered the semi-public over six to one.

CHAPTER V

SPLIT-LEVEL EDUCATION

The public high school is the product of our American democracy. Its growth reflects the social, political, and economic changes that have taken place in our national life. Its development reveals the evolving concept of secondary education from colonial times to the present. The history of its curriculum shows the changing pattern of our educational ideals and practices.

Earlier chapters traced in summary fashion the genealogy of the high school from its remote ancestor, the grammar school, to the private academy, the direct progenitor of the early high school and the connecting link between the two. Each stage showed advances over the one preceding in two different ways: extension of educational opportunities, and expansion of the curriculum. These two developments went hand in hand and with them came for the first time the idea that secondary education should be provided for two different groups, those who were preparing for college, and those who were not.

This has been one of the most influential concepts in the history of American education. It was primarily responsible for the founding of academies and later on of public high schools. It broke the academic stranglehold of the colleges, planted the seed of the elective system on both levels, and altered the entire pattern of secondary and collegiate education.

The original intent of the academies was to serve the educational needs of the non-college group. But they could not break entirely with academic tradition. To the more "practical" subjects, which they had planned to offer exclusively, public opinion compelled them to add those required for college preparation. The expanded curricula of the academies, in turn, compelled the colleges to examine their entrance requirements. Between 1800 and 1820 they began to require arithmetic, geography, English grammar, and algebra, in addition to Latin and Greek.

The early public high schools, beginning in 1821, were also unsuccessful in their attempts to establish complete academic independence. Their influence, however, together with that of the academies, brought about further changes in the colleges. Between 1820 and 1875 they began to recognize and to accept such "non-academic"

subjects as geometry, history, physical geography, English composition, physical sciences, and modern foreign languages.[5]

The transition period between 1821 and 1890 marked the high point of the academies, ended their dominance in the field, and brought secondary education largely under public control. It was a period of great and prolonged educational confusion. Scientific and industrial developments were changing the pattern of American life. Population shifts into large and growing urban centers created a new type of citizen and intensified demands for an enlargement of the high school curriculum to meet the needs of a new industrial and commercial age.

When the Department of Education was set up in 1867, it soon discovered that the high school curriculum was a coat of many colors. Local communities, with a characteristic spirit of independence, had organized their high schools to meet local demands. The system of state control was in its infancy or was not yet born in some states, tottering to its feet in some, rapidly maturing in others. Courses multiplied and then faded away. Students moving with their families from one section of the country to another found it difficult to adjust to a new program of studies. Each college had its own standards and method for admitting students. Parents with college-bound children complained because the schools devoted too much time to subjects not acceptable to the colleges of their choice. Other parents complained because the schools were too much concerned with subjects of no immediate practical value in business and industry. The American high school had growing pains.

One of the first tasks of the Bureau of Education was to find out what the schools were doing. Although the number of public high schools was increasing rapidly during this period, the first information about curricula came only from private schools. Enrollments were generally reported for three curricula: English, classical, and modern foreign languages. Separate reports were made on other schools, also private, primarily devoted to business and commercial subjects, manual and industrial training, music, and art. Many of these had courses on both high school and college levels, but enrollment figures were usually combined.[6]

The first survey of high schools supported wholly by public funds covered the year 1886-87. That year for the first time, enrollments were also recorded for separate subjects—Latin, Greek, French, German, English, free-hand drawing, and mechanical drawing. All of the information was given in addition to the customary report on

enrollments by the two curricula, classical and scientific.[3] No information was given about any courses in mathematics, science, or history.

In the following year the omissions in mathematics and science were partially filled in,[4] but it was 1889-90 before history was added. During the intervening year, enrollments were given in four curricula for public high schools located in cities with populations of 4,000 and above.[5] Another table gave a list of manual training courses and enrollments in all grades in public schools of 28 cities.[6]

Some additional details of the history of the curriculum, covering thirteen broad areas of human knowledge and endeavor, were presented in the last chapter. These details included a short historical sketch of various subjects in each subject-matter field before 1890. Thirteen separate tables listed the subjects, old and new, as they were tabulated by the United States Office of Education between 1890 and 1949. Each table, in terms of individual and total percentages based on total high school enrollments, showed the changes in a single broad field of study for each of six different years.

That type of presentation, made necessary by the accelerated addition of subjects after 1890, could not show the changing pattern of the high school curriculum as a whole. It did show piece-meal the changes that took place in each of the subject-matter fields. To evaluate those changes, we must see them on a broad canvas. To determine their educational significance, we must examine them in their relationship to each other. For this purpose the table below combines the thirteen separate tables into one.

This table possibly presents the most complete statistical summary of curricular developments in our public high schools between 1890 and 1949 that has ever been published. It shows at a glance their scope and depth. It makes plain the twofold function of the high school that has made it the pivotal point in our educational system. It provides the factual evidence for an evolving theory of split-level education that has come to dominate the high school scene.

Although the curriculum survey of 1889-90 was far more extensive than any made up to that time, lack of adequate data limited the tabulation to subjects in only four of the thirteen broad fields. With the possible exception of agriculture, however, it is quite certain that all of the subjects listed in 1910 and even 1922 were in the curriculum before 1890.[7] Their very omission, and the rather startling changes that took place between 1890 and 1900 require an explanation that is important for understanding Table 14.

After 1870 many of the private academies became preparatory

TABLE 14

SUMMARY OF PERCENTAGE CHANGES IN SUBJECT MATTER FIELDS AND OF SUBJECTS ADDED IN PUBLIC HIGH SCHOOLS GRADES 9-12 IN CERTAIN YEARS BETWEEN 1889-90 AND 1948-49 [1]

		1890	1900	1910	1922	1934	1949
	Enrollment in 1000's	203	519	715 815	1,255 2,230	4,967 5,821	5,398
1	Mathematics	66.7 (3)	85.8 (4)	89.7 (4)	74.8 (6)	56.2 (8)	55.0 (7)
2	Foreign Languages	54.1 (4)	75.6 (4)	84.1 (5)	55.0 (8)	35.7 (6)	22.0 (8)
3	Science	32.9 (2)	83.6 (6)	81.7 (8)	58.4 (10)	51.3 (10)	54.1 (11)
4	Social Studies	27.3 (4)	62.3 (7)	71.6 (7)	78.2 (10)	78.8 (18)	99.4 (20)
5	English		60.6 (2)	114.2 (2)	62.8 (7)	95.0 (14)	103.1 (15)
6	Business Education		21.7 (4)	11.0 (1)	42.1 (10)	57.7 (13)	58.8 (14)
7	Vocational and Nonvocational Subjects			8.8 (2)	13.7 (4)	21.0 (15)	34.7 (31)
8	Home Economics			3.8 (2)	14.3 (4)	15.7 (10)	24.2 (10)
8	Agriculture			4.7 (1)	5.1 (2)	3.6 (5)	6.7 (4)
10	Physical Education		2.0 (1)	(1)	14.5 (3)	58.4 (3)	100.1 (6)
11	Music				25.3 (3)	24.8 (5)	20.1 (9)
12	Art				14.7 (1)	8.0 (5)	9.0 (7)
13	Teacher Training		2.6 (1)	1.9 (1)	1.0 (2)	0.1 (1)	0.002 (1)
	Total Subjects	13	29	35	69	111	141

[1] The numbers under the dates represent the total high school enrollment in the nearest whole number of thousands. The numbers in parenthesis under each percentage show the number of different subjects in a broad subject matter field. Percentages are underscored to indicate the year in which they reached a maximum. To the left side of the table references are given to the appropriate tables of Chapter IV.

The percentages were obtained by dividing the total number of students studying all subjects in a given subject matter field by the total high school enrollment for that year. Since duplicates (the same student enrolled in two or more subjects in a single broad field, such as English, or social studies) could not be excluded, the percentages show the comparative student concentrations in different subject matter fields. They do not show the exact proportion of separate students in a given field.

The figures and percentages (all additions and many subject percentages calculated by the writer) were taken from or based on statistics published by the U.S. Office of Education for the years indicated. See Appendix B.

schools for college. Since the colleges still stressed Latin, Greek, and mathematics, the academies gradually tended to neglect most subjects except those. The public high schools, on the other hand, had been compelled to add the principal college subjects. They had also broadened their curricula to satisfy increasing demands for additional subjects. Among these were modern foreign languages, modern history, natural science, and sociology. Many high schools also offered vocal music, shorthand writing, cooking, bookkeeping, calisthenics, and woodworking. (See Note 9). In the meantime more states were passing compulsory education laws.[8] These laws and a rising birth rate were bringing ever larger numbers into the high schools. As the curriculum expanded to meet their greatly diversified backgrounds, capacities, and educational interests, the dual function of the high school became increasingly apparent and difficult. Many of the new subjects were not acceptable for admission to college. Some of the older subjects failed to meet rising college standards. Many short courses, particularly in science, were offered, and some subjects were taught one way for college entrance, another way for more immediate and practical use. Both groups of students suffered educationally, and the number of students going to college from the public high schools was proportionately less in the early 1890's than before 1870.[9]

These and related problems demanded intelligent action and planning. In 1892 the National Education Association appointed a Committee of Ten, with Harvard's president Charles W. Eliot as chairman, to study the entire situation and to make recommendations dealing with it. This committee divided the high school curriculum into nine groups of related subjects and appointed nine sub-committees of ten members each to study them and to make recommendations about their place in the high school pattern.[10] These subjects were: (1) Latin; (2) Greek; (3) English; (4) Other Modern Languages (German and French); (5) Mathematics (arithmetic, algebra, plane and solid geometry); (6) Physical Sciences (physics, chemistry, astronomy); (7) Natural History (biology, botany, zoology, physiology); (8) History, Civil Government, Political Economy; (9) Geography (physical geography, geology, meteorology).

In each of their meetings the sub-committees found it necessary to consider the subjects in relation to elementary and higher education, to teacher training and teaching methods. The comprehensive nature and thoroughness of the final Report make it one of the important documents in the history of American education.[11].

Of the many interesting recommendations three or four had special

significance. One of these had to do with the correlation of elementary and high school studies. The pattern should be set in the lower grades and carried through high school. The study of Latin and modern languages should begin at least by the fifth grade. (The strides made in that direction since 1951 have been slow in coming, but they would receive the Committee's full endorsement.) Less time should be spent on arithmetic than the elementary schools were then giving, to make room for a graduated approach to algebra, plane and solid geometry. Algebra should be taught in connection with arithmetic; the two geometries in connection with drawing, but related to arithmetic and elementary physics. After elementary instruction of this sort in mathematics, the student, at age 14, should go into the formal sudy of algebra, then into plane and solid geometry and trigonometry. The physical sciences should be introduced in the lower grades also, while the students' powers of observation and natural curiosity were very strong and capable of rapid development. Experiments which involved use of simple measuring instruments would bring the child into direct contact with objects and be a valuable preparation for laboratory experiments later on.

The study of natural history or science should begin in the primary grades and continue on through at least one year in high school. No texts were necessary, but the work should be coordinated with the study of literature, language, and drawing. By the use of notebooks and drawing, students would be trained in the art of expression as well as observation.

A coordinated program of history study should be worked out, four years in the grades, and four in high school. The first two years should deal with mythology and biography preparatory to the study of general and American history and the history of various countries, including Greece and Rome. To be properly studied and taught, history should be associated with English, ancient and modern languages, physical and commercial geography. U.S. history should be coordinated with civil government. Students should be required to keep notebooks, and to make abstracts and maps, the last in connection with drawing. English themes should be written on historical subjects. Civil government should be introduced orally in the lower grades, but a text with collateral readings should be used in high school where the emphasis should be on comparative government.

The recommendations on geography were the most revolutionary of all. It was defined as a study of the "physical environment of man." It should include not only a description of the earth, physical geog-

raphy, hut the elements of botany, zoology, astronomy, meteorology, commercial geography, government, and ethnology—man's racial divisions and characteristics. Since it involved so many different elements the study should begin in the lower grades and proceed in logically arranged courses step by step through the high school. It, too, would be associated with English and drawing, in addition to the other subjects mentioned.

It was conceded by all the suhcommittees that natural science, foreign languages, and mathematics should he substantial parts of education. The committee on English felt that it should he given at least equal status with foreign languages and should, hecause of its comprehensive nature, he hasic to the study of all other subjects. The essentials of grammar should be taught in the lower grades, and good English, both oral and written, should be required by teachers of all subjects. This requirement should extend to the high schools where the study of all subjects should contribute to the pupil's training in English. All students should study English for four years in high school. The courses should include literature, training in oral and written expression, historical and systematic grammar. The history of the development of the English language should be part of every student's knowledge. Grammar and word study should go hand in hand, and particularly useful for that purpose would be the study of Latin, French, and German. The study of words could he used to illustrate the political, social, intellectual, and religious development of the English race. The history and geography of English-speaking peoples would also fit into such a pattern of English studies. And finally, the committee recommended that admission of a student to college sbould depend primarily on his ability to write English, as sbown in his examinations in subjects other than English.

There were naturally some objections to the Committee's rather ambitious and idealistic program. Chief among these was the mental strain it might impose, particularly on the younger pupils in the elementary grades. It was argued that the present course of study had alrcady proved difficult for many of them; the proposed curriculum would be even more strenuous.

This opinion had been anticipated and the full report included tbe answering argument. It was true that some of the children had experienced some difficulty in tbeir studies. In the opinion of the Committee tbis had stemmed not so much from lack of ability as lack of interest. The current courses concentrated too much on tbe study of grammar, arithmetic, and geograpby in which learning by rote mem-

ory played tbe major role. Memory was not learning and too great dependence on it stifled tbe child's imagination and left unused and undeveloped many latent capabilities. The new program would not be easy, but presented in the rigbt way it would arouse tbe child's interest, appeal to bis imagination nnd develop his powers of reason and observation, which were greater than commonly supposed. To say tbat a child of only average ability could not learn the elements of algebra and science, for example, was to assume as true sometbing tbat had not even been tried. Motivation based on interest was a powerful factor in all learning. When tbe program had been used for a while and proved too difficult for some, teaching metbods rather than pupil's ability migbt be the cause. Much would be demanded of the children, perbaps even more of tbe teachers. Later on, when new and better methods of teaching bad been developed and better textbooks written, if the program still proved too difficult for some, proper adjustments and cbanges would have to be made for them."[14]

There is little doubt tbat tbe Committee's pbilosophy bad been influenced by two ideas tbat had long held sway in educational circles: that it was the business of tbe schools to impart knowledge as a basis for good citizenship, and to develop mental training by disciplinary drill. By tradition, tbe subjects best suited for accomplisbing botb of tbese purposes were Latin, Greek, and matbematics. To these the Committee, in keeping witb modern needs and developments, added English grammar, composition, and literature; history, modern foreign languages, civil government, geography, physics, chemistry, pbysical geography, and several other science subjects. But they gave chief emphasis to the values of mental discipline, for whicb they bad the support of a new psycbological theory.

Under this theory, which was developed between 1860 and 1890, the mind was thought to be divided into several separate compartments, each of which controlled different faculties, such as judgment, will, memory, reason, imagination, and feelings. It was assumed that mastery of certain subjects trained the separate faculties and that the mental discipline thus acquired was "transferred" for mastery of other subjects.[15] Since this involved an educational process that was the same for all students, essentially the same type of curriculum was necessary for all.

With this in mind, and in view of the different interests and abilities of students, the Committee drew up four suggested curricula: Classical (tbree foreign languages, one modern), Latin-Scientific (two foreign languages, one modern), Modern Languages (two foreign

languages, both modern), and English (oac forcign language, ancient or modern). Common to all four curricula were English (4 years), mathematics (3 years), history (3 years), a foreign languagc (4 years), aad science (3 ycars: physics, chemistry, and physical geography.)

The Committee felt that these subjects wcre essential for a well-rounded high school education. It realized that many studcnts, from choice or necessity, left high school after the first or second year, and that the high schools as a whole did not "exist for the purpose of preparing hoys and girls for colleges." It was cvcn more important for them thaa for the others to havc at lcast thc rudimcnts of a good education. What could he bcttcr for them than aa iatroduction to the fundamentals of linguistic, literary, historical, mathematical, and scientific knowledge? Latin, Gcrman, or French, and English rcpresented the first two fields; history, the sccond; algcbra and geometry, the third; physical geography, and physics or chemistry, the fourth.

Because of the student's continuation in school and because sound educatioaal planaing suggested it, the Committee helieved that choice of a particular curriculum should not be made until aftcr thè first, or hetter still, after the secoad year in high school. Accordingly, most of the suhjects for the first two years were the same in all four curricula. The chief differeaces were in the selection of a foreign language and the substitution of hotany or zoology for history in the second year of the Latin-Scieatific, and Modern Languages curricula.

Of the four programs open to students the Committee expressly stated that the two emphasiziog Modern Laaguages aad English, hecause of tbe conditioas of teacher traiaiag in tbe United States, "must in practice be distinctly inferior to the other two." A student who successfully completed any of the four, however, should he acceptable for college work. If the Committee's recommendations were "*well carried out*" (italics added), they "might fairly be held to make *all* of tbe *main* subjects taught ia the secondary schools of equal rank for tbe purposes of admission to college or scieatific school. They would all be taugbt consecutively and thoroughly, and would all he carried on in the same spirit; they would all be used for training tbe powers of observation, memory, expressioa, and reasoning; aad they would all be good to that end, although differing among themselves ia quality aad substance."

Programs of that sort were badly needed "because the pupil may now go tbrougb a secondary school course of a very feeble and scrappy aature—studyiag a little of many subjects and not mucb of

any one, getting, perhaps, a little information in a variety of fields, but nothing which can be called a thorough training."

Some of the subjects commonly taught in many schools of the day, as the Committee noted, did not appear among their specific curricular recommendations. The omission of such subjects as drawing, music, and elocution did not imply that they should not be offered. But *how* they should be introduced as *supplementary* to other courses was a matter for local school authorities, rather than for the Committee, to decide. Drawing, in particular, was "to be used in the study of history, botany, zoology, astronomy, meteorology, physics, geography, and physiography." This kind of drawing was, in the opinion of many, the most useful type—"namely, that which is applied to recording, describing, and discussing observations." Its use might not "prevent the need of some special instruction . . . but it ought to diminish the number of periods devoted exclusively to drawing." Also, in the "large number of periods devoted to English and history there would be some time for incidental instruction in the elements" of ethics, economics, metaphysics, and aesthetics. "It is through the reading and writing required of pupils, or recommended to them, that the fundamental ideas on these important topics are to be inculcated." And finally, if a need should be felt for more subjects "thought to have practical importance in trade or the useful arts," they could be offered as options for some of the science courses in the third and fourth years of the English Curriculum." [14]

The influence of the Committee of Ten's Report was felt in several ways. It caused widespread discussion of the principles and purposes of education among laymen and professional educators alike. It focused attention on the public high school and its dual role in our educational system: the connecting link between the elementary school and college, and the end of formal education for the great majority of students. It "soon led to considerable uniformity in secondary school courses throughout the United States." [15]

Two other reports made during this period were also influential in bringing about uniformity in high school subjects and in college entrance requirements: The Committee of Fifteen on Elementary Education," and The Committee on College Entrance Requirements."

Among the recommendations of the last named committee there were several which pertained particularly to the high school curriculum:

Although the elective system was recognized, it should not be unlimited. A certain number of subjects should be required for admis-

sion to college: foreign languages (four units, no language in less than two units); mathematics (two units); English (two units); history (one); science (one). Two years of the same science was better than a year each of two different sciences. In addition to a year (one unit) in American history and civil government, colleges should also accept one-half year of intensive study of some period of history, particularly of the United States. The colleges should also accept one unit of economics, which should include a course in elementary political economy and instruction in commercial geography and industrial history. The colleges should accept, in general, high school subjects taught four periods a week for one year under competent instruction.

This last recommendation involved a principle that came to be known as the "equivalence" of subjects. The Committee of Ten had made a similar recommendation, but both committees plainly had in mind subjects that were academic in nature. Although the Committee on College Entrance Requirements expressly stated its belief that all subjects were not of equal disciplinary or cultural value, its recommendation undoubtedly paved the way for later acceptance of such a principle and for many additions to the list of subjects acceptable for college entrance.[18]

There is little doubt that the nation-wide discussion of the reports made by these committees was primarily responsible for the changes that took place in the high school curriculum between 1890-1910.[19] In the curriculum survey of 1894-95, within nine months of the Committee of Ten's Report, rhetoric and three additional subjects in science were listed for the first time. By 1897-98 all but three of the subjects it had recommended had been included.[20]

The outstanding curriculum development in the period from 1890 through 1910, as Table 14 shows, was the increasing proportion of students enrolled in the five subject-matter fields stressed by the two committees. During the same period more non-academic subjects were tabulated. The increasing proportion of enrollments they attracted showed up significantly between 1910 and 1922, when the distribution and concentration of high school studies gave unmistakable evidence of decided changes. These changes became even more evident in the period between 1922 and 1949.

To put this evidence into clearer focus for the entire period between 1890 and 1949, it would be helpful to group the data of Table 14 by related fields. The analysis below provides the basis for the grouping.

Different as they are in content, foreign languages, mathematics, and science have one common characteristic: they are all cumulative

in nature. One does not begin the study of algebra with quadratic equations, or the study of French with one of Racine's comedies, or of pbysics witb Einstein's theory of relativity. In each subject it is necessary to begin with basic forms or concepts and proceed by gradual, logical steps from the elcmentary to the complex. Each successive step depends on the ones preceding and all form parts of a related wbole. Learning such subjects calls for consistent mental effort that cannot be relaxed without the risk of failure or added difficulties. These three subject-matter fields by common consent have long been considered tbe most difficult in the high school curriculum. They form Group A.

English and social studies form Groups B and C respectively. Altbougb they have many things in common, the general content of subjects in the two fields is widely different. In each field thc emphasis is on extensive reading, analysis, and interpretation. Rcsearch papers are often assigned in which attention is paid to orderly presentation, clear expression and tbought, accurate information and, in English at least, to grammar and spelling. Wbile English composition also permits creative effort, in social studies that element is largcly confined to method of presentation. Recitations in both fields arc conducted by lecture or by lecture-discussion techniques, if class size allows.

Group D includes business education, vocational and nonvocational subjects, home economics and agriculture. Their subject matter varies greatly, but the content of each combines some tbeory with practical application. Emphasis is given to the cultivation of somc ability, skill, or hobby that will be useful or enjoyable in the home, on the farm, or in the business world. Learning in these fields has been called training, to distinguish it from the more purely bookish type.

Physical education, music, and art, for the sake of convenienee, are put in Group E.[22] These threc fields, each so different from the others, have one common purpose: to provide opportunity for the diseovery and cultivation of special talents. They afford outlets for creativc and recreational activities that promote physical or artistic health and enjoyment.. Art, in contrast to the other two, encourages and stimulates individual effort. Music and physical education add to that, teamwork and group play. All three tend to develop habits of coordination, determination, and patience. Music and art stress esthetic appreciation and values.[23]

Comparison of Tables 14 and 15 shows that the pattern is essen-

TABLE 15

PERCENTAGE TOTALS OF SUBJECT-MATTER FIELDS IN THE HIGH SCHOOL CURRICULUM, GRADES 9-12, ARRANGED IN GROUPS BY TYPE OF COURSE IN CERTAIN YEARS BETWEEN 1889-90 AND 1948-49

GROUP	1890	1900	1910	1922	1934	1949
Total enrollments in 1000's	203	519	739 915	2,155 2,230	4,497 5,621	5,399
A. Cumulative Subjects	153.7	245.1	255.5	188.3	143.2	131.1
Number of fields	3	3	3	3	3	3
Number of subjects	9	14	18	22	22	24
B. English		80.6	114.2	82.9	96.0	103.1
Number of fields		1	1	1	1	1
Number of subjects		2	2	7	14	15
C. Social Studies	27.3	62.3	71.6	78.2	78.8	99.4
Number of fields	1	1	1	1	1	1
Number of subjects	4	7	7	10	18	20
D. Practical Subjects		21.7	28.1	75.2	99.0	124.4
Number of fields		1	4	4	4	4
Number of subjects		4	6	20	43	59
E. Health, Music, Art		2.0		54.5	91.8	148.2
Number of fields		1	1	3	a	3
Number of subjects		1	1	7	13	22

tially the same for both. By 1910 the cumulative subjects and English, Groups A and B, had reached their greatest proportion of student enrollments.[23] Between that year and 1922 both groups had their sharpest drops.[24] Group A continued to lose, and reached its lowest point in 1949. After 1922 English arrested its descent, but by 1949 it was still some distance below its 1910 peak.[25] All the other groups continued the increases which had begun with additional subject tabulations, and came to their peaks in 1949.[26]

On the basis of statistical evidence, then, it is possible to analyze the broad changes that took place in the high school curriculum and to see how they fit in with educational developments in each of the three periods between 1890 and 1949.

In the first period, 1890 through 1910, the cumulative subjects and English dominated the scene. Student concentration in the cumula-

tive subjects alone was greater than that in all other subjects combined. Social studies made impressive gains and practical subjects showed signs of growing strength. Music, art, and physical education played insignificant roles.

This was the period during which the philosophy of the Committee of Ten and of the Committee on Entrance Requirements had the strongest influence. That philosophy stressed the values of intellectual and cultural discipline. It held that the purpose of high school education was the same for all students: to sharpen one's mental powers, to broaden one's intellectual and cultural horizons, to develop maturity of thought and judgment, to instill a sense of responsibility for intelligent participation in public affairs, and to strengthen character. All students, to the extent of their ability, no matter what their ultimate goals might be, should be introduced to the five great realms of human thought and experience: English language and literature; foreign languages and literatures, particularly Latin; mathematics, algebra and geometry; science, particularly physics, chemistry, and physical geography; history, including civil government. A course of study based on such subjects, for four years, or even for two years, would be the best possible preparation for individual development and civic usefulness. The longer course would also serve as the best avenue to college.

During this same period the work and philosophy of John Dewey began to exercise an influence that was to have a profound effect on the high school curriculum. His thesis that education is life and not preparation for life, and the psychological investigations of G. Stanley Hall and others paved the way for a new approach to study of the curriculum through observation and experimentation. The contrast between the old and the new educational theories was pointed up in a criticism of the Committee of Ten and the other two committees.

Their work was "dominated by subject-matter specialists, possessed of a profound faith in the value of mental discipline. No study of pupil abilities, social needs, interest, capacities, or differential training found a place in their deliberations. The basis of their recommendations throughout was that of individual judgment. It was twenty years afterward before any use was made of investigations as to curriculum content, or any experimental work was made as to grade placement and the organization of the materials of the curriculum. As the committees supported one another, their views became accepted and the reconstructed curriculum which followed soon became crystalized and difficult to change. There was much vigorous dissent from

teachers, but for a long time it was not influential. A change came only as we turned from college presidents and professors, subject-matter specialists, and private school executives, whose interests were in mind training, scholarship as such, and knowledge for knowledge's sake, and who compiled their reports by armchair philosophic methods, to students of educational practices who applied the experimental and quantitative method to the solution of educational problems and built their report on the results of experimental research."[27]

The change mentioned above came with the investigations of another committee appointed by the National Education Association in 1911: Committee on the Economy of Time. Its four reports, published between 1915 and 1919, were "believed to have marked a turning point in the study of the curriculum in the United States."[28] The purposes of the Committee were "to bring about economy of time in the work of schools by the use of scientific methods, to determine the 'socially worth-while instructional materials', their proper placement in the grades, and their organization to fit what was called the 'life-needs' of the pupils, and to eliminate those materials that were no longer considered to be of real worth."[29]

The effects of this "life-adjustment" concept, as it was later called, were plainly evident in the transition period between 1910 and 1922. Proportionately the cumulative subjects and English lost considerable ground, but still remained the leading fields of study. The cumulative subjects constituted the strongest single group, social studies made only minor gains, but practical subjects accelerated rapidly. Health, music, and art secured a strong foothold.[30] The focal point of secondary education was definitely shifting from emphasis on subject-matter to emphasis on the pupils and their life-adjustment needs. The old idea that pupils should conform to the curriculum was giving way to the new concept of adapting the curriculum to fit the wide divergence of student interests and capacities.

During the next period, 1922 through 1949, this movement gained considerable momentum and the positions of the five groups changed radically (Table 15). Through 1934 the cumulative subjects (Group A) remained in the lead; practical subjects (Group D) passed English (Group B) for second place. Health, music and art (Group E) came next to Group B, and social studies (Group C) came last.

By 1949 further shifts had occurred. Group E replaced Group A in the lead. Group D came third, Group B, fourth, and Group C, last. For the second time—the first time was in 1934—the subjects in Groups C and D totaled more than half of the subjects in the entire

high school curriculum. Student concentration in those two groups for the first time was almost as great as the concentration in Groups A and B. Although Group A remained the strongest academic subject-matter field, its loss in proportion of enrollments between 1910 and 1949—124.4—was exactly the same as student concentration in Group D in 1949. Coincidence or not, the decline in the proportion of student enrollments in the cumulative subjects between 1910 and 1949, and the simultaneous increase of enrollments in practical subjects constitute one of the most striking developments in the history of the high school curriculum.

This development did not come all at once or in isolation from other changes. Between 1910 and 1922 the number of subjects listed in the cumulative subjects increased from 18 to 22; those in English, from 2 to 7; in social studies, from 7 to 10, and those in health, music, and art, from 3 to 7. The most phenomenal increase, however, was in practical subjects—from 6 to 20.[83] The number in this group doubled, with a little to spare, between 1922 and 1934. In 1934 and in 1949 student concentration in business education alone was greater than that in foreign languages, science, or mathematics. In 1949 vocational and nonvocational subjects, and home economics had also passed foreign languages.[84] The subjects in Group D as a whole made up 41.8% of the entire curriculum and equalled the number listed in Groups A, B, and C combined (Table 15).

The decided changes that took place in the high school curriculum after 1910, and increasingly between 1922 and 1949, reflected the influence of the new educational philosophy—primarily that of John Dewey. The aim of education was no longer almost exclusively intellectual, but social. Since there was little or no transfer of training, all subjects were of equal educational value if they appealed to the interests of the student. The main function of the school was to foster individual growth in keeping with each child's innate capacities, and to make each child a useful member of society by making school life a replica of the larger life outside.[85] The objectives of secondary education might be summed up in the "seven cardinal principles" that should govern the organization of high school curricula: health, command of fundamental processes, worthy home-membership, vocation, civic education, worthy use of leisure, ethical character.[86]

Although the statement and discussion of these objectives attracted considerable attention, they were too vague and comprehensive to have much immediate and direct influence on the high school

curriculum.[85] They did serve, however, to reemphasize the social purposes of education during the period of adjustment that followed World War I. This happened to be the period also when the last few states adopted compulsory education laws and most states revised and strengthened previous enactments (see Note 8 on p. 78). The entry and retention of more and more students in high school, with their greatly diversified interests, backgrounds, and capacities, increased the demands for additional subjects. The extension of educational opportunities to increased numbers, the goal of "at least a high school education for all," and the social adjustment philosophy—all these helped to bring about the changes in the high school curriculum so noticeable between 1922 and 1949.

But there were two other factors, somewhat contradictory in nature. One of these was a two-pronged assumption that an increase in numbers meant a decrease in average ability, and that in the past only the best students finished high school and continued on to college. Evidence has been cited and recent tests have been made that indicate that both of these assumptions are unfounded.[86] Between 1900 and 1020 a student's chance of finishing high school increased from 16 to 45 out of 100. If those trends continued, for students born in 1040 the chance increased to 62. If they still continue, the chance has increased to 70, for those born in 1950. The chances of entering college increased, for those same years, from 10 to 16 to 22 to 25; of finishing college, from 3 to 9 to 15 to 18.[87]

Do these statistics mean that the average intelligence of students has been decreasing, while the number of students has been increasing enormously? Do they mean that only the best students have finished high school and continued on to college? There is no doubt that more and more students *have* finished high school and that more and more *have* entered college. If only the best students have finished high school and entered college, then the *number* of *best* students has certainly increased. It does not necessarily follow, however, that only the best students finish high school. In recent years 38% of the most capable students who finished high school did not enter college.[88] Is it illogical to assume that some of the *best* students drop out of high school before they finish?

This was a problem of concern to educators in the period around 1890 and before. It has been of no less concern since. But only in comparatively recent years have detailed studies been made to determine the reasons for the failure of many students to complete their high school education. The reasons are naturally varied and num-

erous. Among them are: lack of interest in the work or of ability to do it; the feeling of being "lost in the shuffle" of a large mass of students; indifference of teachers; economic conditions; the difficulty of transferring from one course of study to another; desire for greater independence and freedom from conformity; community environment; poor health.

These were some of the more common causes. Although they were based on conditions in school systems of cities with more than 200,000 population, as reported in 1950, there is little basis for believing that adolescent motives vary to any great extent because of school size or lapse of time.

It is not surprising that the greatest number of drop-outs occurs at age 16, when compulsory education usually ends, and most students are in or between the ninth and tenth grades.[39] What is surprising perhaps is the fact that the percentage of drop-outs is apparently greater for students in vocational than for those in academic courses.[40]

This may simply indicate that academic courses are better taught than those of a vocational nature and attract better students. On the other hand, since academic subjects are admittedly more difficult, some students undoubtedly yield to the lure of the easier path. The boredom that often results is probably difficult to distinguish from the frustration of too great mental strain—and probably more frequent.[41]

Since the high school curriculum was much more varied between 1922 and 1949 than between 1891 and 1922, it would be interesting to compare the drop-out rates of the two periods. Incomplete and uncertain data for the earlier period make this unfeasible. It is possible, however, to get some clues about the influence of the two types of curricula on the percentage of students prepared for, or actually attending college after high school graduation.[42]

In 1891 almost 29% of the high school graduates were prepared for college. In 1900 the percentage had increased slightly to a little over 30. By 1910, when the number preparing for other institutions was included for the first time, the total percentage reached 49. In 1915, it was 52%; in 1922, 46.4. In 1928, at the height of prosperity, it was 42.8.[43] In 1934, during the depression, the percentage dropped to 25. In 1952, it had risen almost to the 1922 level—44.8.[44]

Although the percentages before and after 1915, as pointed out (Note 42) above, are not exactly comparable, those within each period may be compared with each other. Between 1891 and 1915,

while the percentage of graduates prepared for higher institutions increased from 28.6 to 52.1, the number of graduates increased from 23,000 to 176,000—an increase of 665%. During this same period the total high school enrollment increased 505%. Between 1922 and and 1952, a slightly longer period, the number of graduates increased from 243,000 to 1,196,000—an increase of 293%, while the percentage of graduates entering higher institutions had a slight decrease from 46.4 to 44.8. During this period the total high school enrollment increased 164%.

In each period, as these figures show, the number of graduates increased more rapidly than the number of high school students as a whole. In both cases the rate for the earlier period was considerably faster—1.7 times as fast for the increase of graduates and 3 times as fast for the increase in total enrollment—at a time when high school enrollments were largely concentrated in mathematics, science, foreign languages, chiefly Latin, English, and history. Although the figures give no clue to the quality of the work, the great increase in the number of graduates *prepared* for college does *not* suggest a decrease in the average level of intelligence or ability. Neither does it prove or disprove that only the best students graduated.

At the beginning of the second period, although they were still fairly strong, mathematics, foreign languages and science had gone noticeably down the scale of student attention. Even English had suffered a temporary relapse. By 1934 and increasingly by 1949 it was apparent that a new type of secondary education was in vogue, and that a new concept of split-level education had been evolved.

The new concept was based on the assumption mentioned above, that large increases in numbers meant a decrease in the average level of intelligence. It therefore followed that a curriculum primarily academic or bookish in nature, was not suitable for the growing masses of high school students. Their minds were not too susceptible of mental discipline. In place of physics or chemistry they needed general science; in place of algebra, general mathematics. Since they needed subjects of practical and immediate value, foreign languages were a waste of time for most. Although English should remain a required subject for three or four years, grammar had to be diluted, and the study of literature, almost perforce, had to be turned into an obstacle race in reading.

Among the social studies, with better citizenship and civic betterment as worthy objectives, history of the past was unimportant. Contemporary problems were best solved in the light of contemporary

knowledge of national and international affairs. American history should become—and did after 1928—the leading subject, even if the neglect of ancient and European history isolated it from the logical stream of historical development. To give students a hetter grasp of the current scene, American history should be supported hy such courses as prohlems of democracy, orientation, occupations, sociology, economics, world geograpby, and world history.

But there are other sides of a well-developed, socially adjusted personality. Man does not live hy mind alone. Certain practical or domestic arts should supplement mental training for hoth sexes. Dexterity of hand, familiarity with machines and tools, acquaintance with business methods and procedures—all these would serve many practical needs of daily life. They would lead to self-sufficiency and in many cases to self-support.

Nor should health and cultural pursuits he neglected. The proper care of the body, cultivation of sports that could be followed in later life, development of artistic and musical talent—all these would yield rich dividends in physical well heing, in esthetic enjoyment, and in rewarding use of leisure time.

There is little douht that the relatively modern practice of adapting courses of study to the individual student's interest and ahility is more intelligent than a system of rigid requirements with *no* flexibility. There is also little doubt that an almost unlimited numher of widely different electives presupposes a greater maturity of judgment than most students possess, or a more effective counseling service than scientific tests and measurements have yet produced. It cannot be denied tbat the proportion of students who finish high school has heen gradually increasing since 1890. Neitber can it be denied, on the other hand, tbat the more flexible curriculum during the period 1922 through 1949 failed to increase tbe proportion of graduates attending higher institutions.

The primary function of the high school has never been and is not now the preparation of students for college. The number of students who drop out has always been greater than the number who finish, and the number who finish has always been greater than the number who go to college. Tbe kind of education both groups receive can constitute one of our nation's greatest assets or becomc onc of its greatest liabilities.

The new form of split-level education may be the salvation of many students. The less difficult and more practical subjects may be the only ones tbey can master under ordinary teachers and in crowded

classrooms. That some students are not capable of strenuous mental effort is unfortunately true. But split-level education often results, not from lack of ability, but from *under-estimation* of a student's capacity, by himself, his parents, or his adviser, or from the very human tendency, to which even students are prone, to follow the path of least resistance. Those who make the wrong choice in high school, whatever the reason, often realize it too late to make the necessary substitutions or to change their objectives. The effect on a student can be disastrous, in lowered morale and self-confidence, in loss of interest, and in lack of adequate preparation for college or for the larger world outside. Here is the educational fallow ground we must cultivate. Here is the educational wasteland we can and must reclaim.

[1] *Cubberley*, p. 315, lists the separate subjects and the dates they were first accepted by leading colleges. See *Brown*, pp. 231-32, 371-72, for a similar list.

[2] It is interesting to note that business and commercial schools, mostly under private control, were offering Spanish, along with French and German, as early as 1873 (CR 1873, p. 581). Separate professional courses were not listed that year, and were first noted in CR 1877, pp. 372-75. By 1889-90 the list of professional courses had been considerably enlarged, and Latin and Greek had been added to the languages taught (CR 1889-00, II, pp. 1621-28).

[3] See Chapter II, Notes 2 and 4.

[4] CR 1887-88, p. 490.

[5] CR 1888-89, II, pp. 831-52. The four were: classical, English or scientific, commercial, teacher training, and "other courses and unclassified." No data were given for separate subjects.

[6] *Ibid.*, pp. 1363-66. It was impossible to separate statistics for the high schools from those of the lower grades.

[7] In addition to the comments above, see comments under various tables in Chapter IV.

[8] By 1890, 26 states; by 1900, 32; the remaining 12 by 1918. By 1916 most of the states had amended the laws previously passed. See CR 1915-16, II, p. 22, for separate state provisions and dates.

[9] CR 1892-93, II, pp. 1462-64; *Brown*, pp. 416-17.

[10] On President Eliot's committee were five college presidents, three headmasters of private academies and high schools, one college professor, and the Commissioner of Education, W. T. Harris. Of the ninety members of the nine sub-committees, forty-seven were from colleges or universities, forty-two from secondary schools, and one was a government official, formerly a college professor. Among the members were some of the best known educators of the day: Woodrow Wilson, William C. Collar, Benjamin I. Wheeler, George L. Kittredge, Charles H. Grandgent, James Harvey Robinson, Ira Remsen, and Francis W. Parker, to name only a few.

[11] The Report is summarized in CR 1892-93 (published in 1895), II, pp. 1415-1446. Various comments are given, pp. 1446-91. The complete report was published as

[20] These three, botany, biology, and zoology were first tabulated in CR 1909-10, II, pp. 1178, 1181, 1183-84. In Table A, p. 1139, figures for biology were combined both with those for botany and with those for zoology. Meteorology was never tabulated. Apparently it was considered a part of physical geography. See Chapter IV, Table 3 above.

[21] With the exception of courses in health, hygiene and sanitation, individual subjects in this group generally come under extracurricular activities. Driver education may be used, however, to round out a course of study for sub-average students.

[22] Although teacher training is listed as a subject-matter field (Table 14), it does not logically fit into any of the five groups. It played an extremely minor role in the curriculum.

[23] Although Table 14 shows science at its peak in 1900, its actual peak came in 1895-96 (Chapter IV, Table 3 and comments). Since the peaks for mathematics and foreign languages came in 1910, the percentage of the group as a whole increased through that year.

[24] Mathematics dropped considerably between 1910 and 1915, but the addition of arithmetic and general mathematics in 1922 checked its decline for a few years. Science declined considerably between 1900 and 1905. The addition of three new subjects in 1910 (see Note 20 above) kept its percentage that year only slightly below its 1900 level. But the addition of general science, and an increase in biology in 1922 could not keep the whole science field from its severest loss, between 1910 and 1922.

[25] The peak was maintained through 1915. A new method of tabulation accounted for part of the decrease between that year and 1922. The various schools reported enrollments in English in so many different ways that separate statistics for rhetoric and English literature could not be continued after 1915. BS 1920-22, II, p. 533.

[26] Some of the individual subject-matter fields, as indicated in comments on the appropriate tables of Chapter IV, reached their peaks in 1915: music, art, and agriculture. By 1949, however, only art was considerably below its 1915 peak. Since 1915 was not one of the years listed, Table 14 shows art at its peak in 1922, music and agriculture, in 1949.

[27] *Cubberley*, pp. 543-44.

[28] *Knight* (2), p. 103. See Cubberley, pp. 544-45.

[29] *Knight* (2), p. 103.

[30] Between 1910 and 1922 enrollments in Groups C, D, and E increased 455%, or four times as rapidly as those in Groups A and B, which increased 114% in the same period. High school enrollments, on which the subject percentages were based, increased 191%.

[31] See Table 15 for the number of subjects listed in the other years. The number listed in 1915 was the same as in 1910 for each group except health, music, and art (Group E). Since the Office of Education did not collect complete statistics on the subjects in Groups D and E until after 1915, the contrast between their status in 1910 and 1922 seems greater than it actually was. The total percentage for each of the five groups in 1915 was as follows: A, 215.6; B, 114.2; C, 67.4; D, 49.5; E, 55.6. In 1922 an increase in physical education was more than offset by a decrease in music and art. For the 1914-15 statistics, see CR 1915-16, II, pp. 477, 500-503, 535.

[32] Music was also ahead of foreign languages, but it is doubtful if there was any "competition" between those two fields. For all of these comparisons, see Ch. IV, Tables 6, 2, 1, 7, and 8 respectively.

[33] See *Kondel*, pp. 486-87; *Cubberley*, pp. 506-07; *Russell-Judd*, pp. 456-57; *Knight* (1), pp. 521-24.

[34] *Kondel*, pp. 489-90. The principles were set forth in *Cardinal Principles of Secondary Education*, U.S. Bureau of Education, *Bulletin* 1918, No. 35. It was the work of the Commission on the Reorganization of Secondary Education, which was appointed in 1918 by the National Education Association. Ten different subject-matter committees reported on English, social studies, natural sciences, modern languages, ancient languages, household arts, manual arts, music, business, and agriculture. There was another committee on the relationship of high school and college, and a reviewing committee. In addition to these reports, a special committee of the Mathematical Association published a *Report on the Reorganization of Mathematics in Secondary Education* (1923). A committee of the American Classical League issued its *Classical Investigation* (1925), and two American and Canadian Committees on Modern Languages published *Reports on Modern Language Teaching* (1929 and 1930). See *Kondel*, pp. 488-89. *Knight* (2), pp. 102-05.

[35] *Kondel*, p. 490.

[36] Students in two high schools were given the same psychological tests at an interval of 15 years. Although the number of students had increased markedly during the period, the average scores and variability of scores of the two sets of students had no significant differences. Between 1931 and 1942 the high school graduates entering the University of Minnesota maintained a highly constant average percentile rank. See *Wolfle*, p. 173.

[37] *Wolfle*, p. 172.

[38] *Wolfle*, p. 175.

[39] These and other statements in this section were based on information contained in U.S. Office of Education *Circular* No. 269 Reprint, 1953. See pertinent comments on Tables 86 and 87 of Appendix G.

[40] For a discussion of this problem and others, and of suggested remedies, see the first reference cited in the preceding note.

[41] In some high schools (see Note 39) that offered all types of courses the drop-out rate was higher than in those whose offerings were more strictly academic.

[42] This distinction is necessary. Between 1891 and 1915 the percentages indicate the proportion of graduates *prepared* for college and other higher institutions. Between 1922 and 1952 the percentages indicate the proportion that presumably entered college after graduation in the preceding year. The comparison between the percentages before and after, therefore, is merely suggestive. See Appendix D for additional details.

[43] Calculated from the figures given in CR 1926-28, Ch. 24, Table 50. See Note 42 above. For the years 1910 through 1934 the separate percentages for college alone were 34.0, 35.9, 32.1, and 21.3 respectively. No separate breakdown was made for 1952. "Other higher institutions" included Agricultural and Mechanical (Land Grant) Colleges, Scientific Schools, Normal Schools, and Teachers Colleges, as distinguished from Liberal Arts Colleges.

[44] In 1940 the percentage was 35.2; in 1944, 30.8, and in 1950, 40.6. These percentages were calculated from BS 1950-52, Ch. 1, Table 6. The percentages in this note, it should be pointed out, were based on data that included figures for private schools. Those for public high schools alone could not be determined. Presumably they would be slightly lower.

CHAPTER VI

SUBJECT, GRADE, AND COLLEGE

By etymology the word *school* means *leisure.* Among the Greeks it was the time an adult had free from his daily routine. Since be often spent such spare time in listening to a lecture or in taking part in an intellectual discussion, tbe word came to designate pursuits of tbat kind, and finally, the place for sucb pursuits. To a Greek the term *schoolwork* would bave been completely foreign and strange or—to use his word for it—hopelessly barbaric.

We have examined this barbaric activity — American high school style — in the last two chapters. In them we traced the development of the high school curriculum as it expanded to meet the diverse needs and interests of n progressively dynamic and democratic society. We listed different subjects ns they were tabulated by the United States Office of Education and entered the combat zone of the high school mind. Each table was n stntistical barometer of the cbnnging academic weatber, and from their composite rending we charted its nmazing course from tbe stern scholastic calm of the Gay Nineties to thc elective confusion of the Nuclear Age.

In all of the tables, wbetber for separate subjects, subject-matter fields, or related fields within a group, percentages based on total high school enrollments showed tbe changing proportion of students in each of those three categories. By applying the pereentages to the total enrollment, always given to the nearest tbousand, it was possible to calculate actual enrollments by subject, subject-matter field, or group, in a given year. In 1890, for example, the total high school enrollment was 203,000. Of these, 45.4% or 92,000, studied algebra. In 1049, out of an enrollment of 5,399,000, students in algebra numbered 1,440,000—26.8%. Between the two dates total enrollments had increased 2560%; students in algebra, 1475%. Stated in another way, 45 out of every 100 students studied algebra in 1890; in 1940 the number was 27 out of every 100. If the 1890 percentage had been maintained in 1049, in that ycar algebra would have gained 080,000 students.[1]

Similar statistics could be derived for all subjcets, subject-matter

fields, or groups, from the various tables in Chapters IV and V. Separately or in combination, the percentages and the figures on which they were based show the emphasis each subject or field or group received in the high school curriculum between 1890 and 1949. They show the *breadth* and scope of the main educational developments that took place in that period.

But there are several closely related and important parts of these developments that such subject-matter statistics did not touch upon. They did not show the grades in which many separate subjects by custom or design had been offered. In what grades, for instance, were chemistry and physics usually studied? In the last 20 years chemistry generally has been offered in the 11th grade, physics in the 12th. Were those their positions in 1890? If not, in what grades were they taught? When were they shifted to grades 11 and 12? Was first-year algebra in grade 9 followed by second-year in grade 10, and then by plane geometry, solid geometry, and finally trigonometry?

These questions must be answered, if possible, so that other significant data may be collected and analyzed. The statistics on algebra, given above, showed that the number of algebra students increased tremendously between 1890 and 1949, but that the proportion of such students decreased progressively after 1910. Did similar decreases take place in the various courses in algebra and mathematics in relation to the grades in which they were taught? Did the grades in which they were taught have any influence on enrollments? Did the introduction of new courses in certain grades affect enrollments in other courses or subjects offered in the same grades, or in the next grade of a sequence? Did the sequence of courses in one subject affect the sequence in another?

Many of these questions probably cannot be answered with absolute finality. Even tentative answers, however, may provide additional details of interest to educational history and may suggest possible solutions for some of the educational problems that confront us today.

During the last sixty years the increase in high school enrollments has been caused by rising birth rates, extension of educational opportunities, and longer continuance in high school. Although college enrollments have also increased tremendously in this period, most students still end their formal education with high school while many others drop out before they graduate. The type of education they receive is of the utmost importance to them as individuals and as citizens. The type of education is equally important for those who continue to college, and determines in a large measure their choice of

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TABLE 16[1]

TIME-TABLE FOR FOUR COURSES OF STUDY SUGGESTED BY THE COMMITTEE OF TEN

	Classical				Latin-Scientific				Modern Languages				English			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Latin	1	1	1	1	1	1	1	1					1	1	1	1
Greek			1	1												
French		a	a	a		a	a	a	1	1	1	1	b	b	b	b
German		1	1	1		1	1	1	a	1	1	1	b	b	b	b
Algebra	1		½	½	1		½	½	1		½		1		½	½
Geometry		1	½			1	½			1	½			1	½	
Trigonometry				½				½				½				½
Astronomy							½				½				½	
Physics		1				1				1				1		
Chemistry				1				1				1				1
Physical Geography	1				1				1				1			
Physiography[2]								c				c				c
Geology								½				½				½
Meteorology							½				½				½	
Botany						1				1				1		
Zoology						d				d				d		
Physiology								½				½				½
History	1	1		e	•	1		1	e	1		1	e	1	1	1	1
English	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1

a German or French. b Latin, German, or French. c Geology or physiography. d Botany or zoology. e Trigonometry and higher algebra, or history.

[1] References were given in Note 3 of the text. The figures 1 and ½ indicate the amount of time in terms of an academic year. The number of periods per week is not shown. They varied for different subjects and occasionally for the same subjects in different curricula. The general pattern was as follows: in the first year of a foreign language, classes met five times a week, thereafter, 4 times. Mathematics and history classes in grade 9 met 4 times each; in grades 10 and 12, 3 times; in grade 11, 2 times (in the English curriculum, 4 times). All science courses met 3 times. English in grade 9 met 4 times; in grade 10, 3 or 4 times in the English curriculum, 3 times in the others; in grade 12, 2 times in the classical curriculum, 4 times in the others. Each of the four curricula had a total of 20 periods a week for each of the 4 high school years.

[2] "A more advanced treatment of our physical environment in which the agencies and processes involved, the origins, development, and decadence of the forms presented, and the significance of the earth's face are the leading themes . . ." *Committee of Ten*, p. 209.

The changes made in the grade assignments of physics and chemistry are revealing.

The Conference on Science recommended that chemistry be taught before physics and that physics be taught in the twelfth grade. It recognized that this was "plainly not the logical" order but one required by the necessity of more mathematics, considered essential for the study of physics but not of chemistry. In its Table III the Committee of Ten reversed this order to insure at least a half year of physics before meteorology was taken up in the second half of grade 11, and a whole year before physiography was studied in grade 12. With this arrangement students would have first-year algebra in grade 9 (4 periods), plane geometry and second-year algebra in grade 10 (2 periods each) in preparation for physics in grade 11. With physics they could finish second-year algebra and solid geometry (2 periods each).

In its model curricula, however, the Committee placed physics in grade 10. Its reasoning was twofold: the first two years should be the period in which students could explore their interests and capabilities. It was important for them to discover their several aptitudes before they chose which curriculum they would follow. Physics best represented the "inorganic sciences of precision" in which all students should have some experience. Since many students, from necessity or choice, left school after grade 10, that grade was the best place for physics.

How widely the model curricula were adopted by the schools could not be determined. By 1910 the Committee's *Report* had become "famous" and "for seventeen years" its recommendations had "been the inspiration of many thousands of high school principals and teachers whose aim has been to live up to the model courses of study arranged by that committee."[4]

Table 17 below tests the possibility that many schools did follow the model curricula, in whole or in part. To make this test it was assumed that the subject enrollments, as given in the selected curriculum surveys, represented the students in the grade to which the subject had been assigned by the Committee of Ten. Total enrollments in physics, for example, presumably came from grade 10. The percentage for physics, therefore, shows what proportion of students in that grade studied physics in a given year.

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TABLE 17

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	1890[2]	1900[3]	1910[4]	1922[5]	1934[6]	1949[7]	1955[8]
High School enrollment	203	519	915	2230	5621	5399	6584
Grade 9 enrollment	87	223	393	869	1827	1641	1998
Grade 10 enrollment	53	135	248	608	1540	1491	1782
Grade 11 enrollment	37	93	163	427	1231	1242	1500
Grade 12 enrollment	26	68	111	326	1023	1026	1304
Grades 9,11,12 enrollments	150	384	667	1602	4081	3909	4502
Grades 10 and 11 enrollments	90	228	411	1035	2771	2733	3282

Grade(s)	Course or Subject	1890	1900	1910	1922	1934	1949	1955
9,11,12	Algebra 1,2,3[9]	61.4	76.1	77.9	55.2	40.7	37.1	34.9
10 & 11	Geometry	48.1	62.4	68.8	48.9	34.4	25.8	22.8
12	Trigonometry	--	14.6	15.3	10.5	7.4	10.6	13.0
11	Astronomy	--	15.5	3.0	0.3	0.2	--	--
10	Physics	87.1	73.2	54.0	32.6	22.9	19.5	17.9
12	Chemistry	78.9	58.9	56.6	50.3	41.6	40.9	37.9
9	Physical Geography	--	54.4	45.1	10.0	4.9	--	--
12	Geology	--	27.6	9.5	1.1	0.6	--	--
10	Botany	--	--	58.2	14.0	3.3	0.5	--
10	Zoology	--	--	25.6	5.6	2.2	0.4	--
12	Physiology[10]	--	209.4	125.8	34.8	10.0	5.2	--

[1] Figures immediately under the dates give the total high school enrollment to the nearest thousand. For a discussion of grade enrollments in 1890 and 1900, and of the particular situation from 1919 through 1934, see Appendix C. Although the recommendations of the Committee were not known in 1899, the grade locations of Table 16 were assumed for that year. Percentages underscored mark the year in which they reached the highest point. To facilitate comparison all percentages were carried through 1955. For percentages based on total high school enrollments, see Chapter IV, Table 1 (Mathematics) and Table 3 (Science).

[2] CR 1889-90, II, pp. 1368-91.

[3] CR 1899-1900, II, pp. 2129-36.

[4] CR 1909-10, II, pp. 1169-81.

[5] BS 1920-22, II, pp. 560-04.

[6] *Bulletin 1933, No. 0*, Table 3.

[7] BS 1948-50, Ch. 5, Table 3.

[8] *Pamphlet No. 118*, Table 3 (Science) and Table 12 (Mathematics); *School Life* (June 1956), pp. 6-7.

[9] For the sake of uniformity and convenience the three courses in algebra, elementary (first-year), intermediate (second-year), and advanced (college algebra), are called algebra 1, 2, and 3 respectively.

[10] Anatomy and hygiene, with physiology, formed a half-year course, 3 periods a week.

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the numher of students in that gradc. Sincc physiology in grade 12 or in grade 11, does not conform to this principle in 1000 nnd 1010, it could not have heen offered exclusively in cither of those grades in those years.

Although no other suhjcct percentage runs contrary to this principle, that fact does not "prove" thnt the gradcs assigned to each subject are necessarily correct. There arc other factors to he considered. One of these involves a comparison with suhject pcrcentnges hased on total high school enrollments. Subject percentages worked out on this hasis show that physics nnd chemistry were nt their highest percentage points in 1890; that astronomy, physical geography, geology, and physiology were at their highest points in 1000, and algebra nnd geometry, in 1910. Except for trigonometry, all the percentages in this tahle follow that pattern exnctly, subject for suhject.

This is not surprising. Registrations in each suhject nre the same in the corresponding years of the three tables. They form the nppropriate common hase into which total high school or grade enrollments are divided to ohtain the necessary percentage in a given year. Despite the great differences in size hetween the two kinds of enrollments and the resulting percentages, the comparahle suhject percentages not only reach their peaks in the same years, they all hegin to decline in the period immediately following their peaks. In this respect trigonometry also conforms to the expected pattern.[5]

If the comparison hetween total enrollment and grade enrollment percentages is carried a step further, it throws some douht on the grade assignment of at least one course. In Chapter IV, Tahle 3, chemistry shows a percentage increase between 1910 and 1022. Tahle 17 shows a decrease. Although it is unlikely that a grade enrollment would show the same proportionate increase or decrease in a given period as the total enrollment, the percentage decrease for chemistry in this tahle deviates a little too much. Another grade 12 suhject, trigonometry, shows a percentage decrease in both tahles. Both of these instances mean, not that enrollments in grade 12 are incorrect, hut that chemistry is prohahly in the wrong grade in 1910 and 1922.

Support for this tentative conclusion was found. In 1934 chemistry and physics had hecome the "predominating sciences of the third and fourth ycars."[6] Even as early as 1928 physics had hecome "generally a fourth-year suhject."[7] Since chemistry had passed physics in enrollments for the first time in 1928,[8] it is unlikely that physics would have heen shifted to compete with it in the same grade. It is more likely that chemistry had shifted from grade 12 to grade 11 *before*

1928, if indeed it had ever been exclusively in grade 12 at all. On the other hand, if chemistry *had been* in grade 12 and physics in grade 10 during most of the time between 1890 and 1922, when grade 10 was consistently twice the size of grade 12, this would easily account for the two-to-one proportion of registrations in physics over those in chemistry between 1890 and 1915. In 1922 chemistry narrowed the gap remarkably.[8] This lends further support to the doubt about chemistry expressed above. Perhaps between 1915 and 1922 chemistry was shifted to grade 11 and physics to grade 12 or—and this seems more logical—neither had been exclusively in the grades recommended by the Committee.

There was no conflict in the order preferred by the Conference on Science—physics before chemistry—and the order preferred by the Committee—physics before meteorology and physiography. There was a conflict of opinion about the amount of mathematics needed for physics. The Committee's final shift of physics to grade 10, with only a year of algebra as preparation, seemed to imply that the Conference was wrong about the need for more mathematics. At any rate, the Committee's views won out—on paper.

On the practical side, however, there was an unexpected development. Although the Conference on Geography had doubts about the availability of suitable textbooks and adequately prepared teachers in meteorology and physiography, the Committee expressed hopes that both might be supplied. Apparently these hopes were not met. Neither subject was ever listed in any of the curriculum surveys. This left a gap in all of the curricula except the classical, and may partly explain the meteoric rise in popularity of physiology and, to a much less degree, of geology, both assigned to grade 12 (Table 16). But the former, as pointed out above, was obviously not exclusively in grade 12 in 1000 and in 1010. Its percentage for grade 11 in 1000 would also have been well above 100. Only grades 11 and 12, or 10 and 11, would yield a plausible percentage for 1000 and 1010. Since it had never been assigned to any grade except 12, the former seems more logical. Geology, without doubt, was always in grade 12.

If physics had been shifted to grade 12 by 1922, as seems likely, it would not be logical to assume that it was shifted from grade 10. There must have been a period in which it was first in grades 10 and 11 and then in 11 and 12. A shift from grade 10 to grades 10 and 11 by 1900 would be a natural step, and from that position, to grades 11 and 12, by 1910. Although these shifts would have made physics and chemistry partial competitors with each other and with physiology

in 1900 and complete competitors in 1910, registration figures for each would not have made this impossible. In 1900 those for physiology were greater than those for chemistry and physics combined. But in 1910 the latter two combined pulled ahead of the former. This was the year in which botany and zoology were first listed in grade 10. It is unlikely that the two of them would have attracted nearly 84% of that grade if they had been competing with physics. Their rather drastic decreases by 1922 were caused by the marked rise of biology.

The final shifts of chemistry and physics to grades 11 and 12 would also explain another development. Each of them, in contrast to physiology and geology, was a year's course. This undoubtedly helped them to become the leading sciences in their respective grades. As early as 1915 physics had overtaken physiology and geology combined. By 1022 chemistry too had moved ahead. In its grade neither subject has had a rival in the field of science since those years.

Of the other subjects listed in Table 17 the locations of plane and solid geometry and algebra 2 are the only ones open to question. By 1928 plane geometry, which is primarily a year-course, had "shifted from a second or a third year subject to an almost exclusively second-year subject." [10] Before that year solid geometry, which is usually a half-year course, must have been in grade 11 or 12. The location of the two geometries probably meant that algebra 2, before 1928, was in grade 10, primarily as a half-year course, and was shifted to grade 11 when plane geometry was shifted to grade 10.[11] Since 1934, without question, plane geometry in grade 10 has usually come between algebra 1 in grade 9 and algebra 2 in grade 11. This might very well explain the decrease in algebra 2 students between 1934 and 1949. It might also be a contributing factor in the decrease of students in physics during the same period.

"Arguments" such as these do not of course "prove" that all the various shifts mentioned in the last few pages took place exactly at the times or in the ways indicated. The next table takes these possibilities into account and shows what the percentages would have been if they had been carried out.

This table lists all of the principal subjects and courses in mathematics and science offered in the public high schools between 1890 and 1955. It shows the most likely possibilities for their respective grade locations before 1934, with the resulting percentages, and underscores those that seem most probable. Before that date complete certainty is impossible without additional information; after 1922 no subject

TABLE 18

ENROLLMENTS IN MATHEMATICS AND SCIENCE IN PUBLIC HIGH SCHOOLS EXPRESSED AS THE PERCENTAGE OF STUDENTS IN THE GRADE OR GRADES IN WHICH THE COURSES WERE REASONABLY CERTAIN OR KNOWN TO HAVE BEEN OFFERED: 1889-90 TO 1954-55[1]

Course or Subject	Grade(s)	1890	1900	1910	1922	1934	1949	1955
Algebra 1,2,3	9, 11, 12	64.1	76.1	77.9	55.2			
Algebra 1,2,3	9, 10, 11	62.1	64.8	64.7	47.0			
Algebra 1	9					70.1	63.5	60.3
Algebra 2[2]	11					34.9	29.9	28.5
General Math[3]	9				31.7	22.8	42.9	40.1
P. & S. Geometry	10, 11	48.1	62.4	58.8	48.9			
P. & S. Geometry[4]	10, 11, 12	37.3	48.1	54.1	37.2			
P. & S. Geometry	10, 12	64.8	70.1	78.6	54.1			
Plane Geometry	10					55.1	40.2	37.3
Solid Geometry[5]	12					10.8	9.2	11.4
Trigonometry[6]	12		14.8	15.3	10.8	7.4	10.6	13.0
Physics	10	87.1	73.2	54.0	32.6			
Physics	10, 11	61.3	43.3	32.8	19.2			
Physics	11, 12	73.3	51.4	48.7	26.6			
Physics	12				61.1	34.6	28.6	23.8
Chemistry	12	78.2	58.9	56.6				
Chemistry	11, 12	32.8	24.2	22.2	21.9			
Chemistry	11				39.6	34.6	33.2	32.2
Geology	12		27.6	9.8	1.1	0.6		
Physiology	11, 12		68.4	51.0	15.1	4.8	2.3	
Astronomy	11		15.8	3.0	0.3	0.2		
Biology	10			3.9	32.2	63.3	66.8	72.6
Botany	10			68.2	14.0	3.3	0.8	
Zoology	10			25.8	5.6	2.2	0.4	
Physical Geography	9		54.4	45.1	10.9	4.9		
General Science[6]	9				45.9	54.8	68.4	73.0

According to BS 1926-28, p. 966 only advanced arithmetic was taught in 1922. In 1934 elementary and advanced arithmetic and general mathematics were listed separately. For lack of other information, all were assigned to grade 9. In 1949 general mathematics, advanced general mathematics, and mathematics review were listed separately. All were assigned to grade 9. The percentage for general mathematics definitely in grade 9 alone was 42.2.

[4] The figures for plane and solid geometry were first broken down in 1928.

[5] See Note 4, Table 19 below.

[6] The percentage for 1955 was estimated by the writer on the basis of the trend in general science as compared with biology.

assignment to grade is really in doubt. Percentages not underscored (before 1934) are kept to make them readily accessible for other judgments. Shifts in grade location prevent the underscored percentages from forming an observable pattern, but those for the same grade(s), underscored or not, show the patterns or trends unaffected by shifts.

A comparison of this table with Table 16 shows that after 1922 there was only one change in the grade location of any course in mathematics—solid geometry was shifted from grade 11 to grade 12. Algebra 3, omitted from Table 18, since it was identifiable by registrations only in 1949, was in grade 12 in both tables. The main difference between the two was the addition of general mathematics, or arithmetic, first listed in 1922.

It is interesting to note that in 1922 and afterwards physics and chemistry were in the order and in the grades originally suggested by the Conference on Science and not in the grades or the sequence shown in Table 16. Of the six other sciences listed in Table 16, all except physiology had disappeared by 1949. Since 1922, two newcomers, general science (grade 9) and biology (grade 10), together with chemistry and physics have formed the main rungs in the tapering ladder of high school science studies.

Among these four subjects, although the study of one in grade 9 or 10 may encourage or discourage study of one in the next higher grade, there is no fixed or necessary sequence. General science is usually, but not necessarily, studied before biology, biology before chemistry, chemistry before physics. But physics may be the first science to be attempted.[11]

In contrast to this, the study of mathematics, by tradition if not by inherent necessity, has long followed a grade sequence. The introduction of a new course, general mathematics, has served to lengthen the ordinary sequence and to postpone the study of elementary algebra, after its usual starting point, if not to divert some students from it altogether. The appearance of a new course, advanced general

mathematics, first listed in 1949, suggests that some diversion has resulted.

Although such courses may provide mathematical training for students who would or could not otherwise receive it in high school, they probably also represent an attempt to overcome inadequate preparation in the lower grades. In that respect such courses may mark the beginning of another vicious cycle, for the colleges in their turn have found it necessary to add high school algebra to their freshman curriculum.[13] Since the majority of high school students who study general mathematics *may* not *enter* college, there may be no connection between increasing enrollments in that subject and the mathematical shortcomings of college freshmen. On the other hand, those who are compelled to study it in high school or do study it before they begin elementary algebra must thereby postpone the normal sequence at the beginning, and most likely are forced to shorten it at the end. The latter result may only be surmised; the results of initial postponement may be illustrated by a few statistics.

In 1922 registration in arithmetic, listed that year for the first time, made up 31.7% of grade 9 (Table 18), or approximately 275,500 students (all enrollments from Table 17). If it is assumed that registrations in algebra 1 were 75% of all algebra students,[14] they constituted 77% of grade 9, or approximately 669,000. Registrations in both subjects totaled 944,500 students, 75,500 more than enrollments in grade 9. It cannot be proved that all or most of these students were in algebra 1; it is certain they were not in grade 9.

In 1928 the situation apparently changed; registrations in the two subjects equalled only 98% of enrollments in grade 0. In 1034, as Table 18 shows, they equalled only 92.9%. But in 1940 they were 106.4%, and in 1955, 109.4%.

During all of these years, however, including 1022, it is not possible to say how many students in grade 9 were actually studying algebra 1 or general mathematics. It can simply be stated that the number was a certain percentage of enrollments in that grade, with a strong and natural assumption that the great majority came from grade 9. If some of these came from grade 10—another likely assumption—the potential registrations in plane geometry, generally a grade 10 subject, would be reduced. Similarly, potential registrations in algebra 2, a grade 11 subject primarily, would also be reduced. In both cases, actual grade enrollments and percentages in both subjects would very likely decrease. This did not happen between 1922 and 1934, but it did happen between 1934 and 1940. Between 1940 and 1955,

TABLE 19

CONTRAST BETWEEN THE RATE OF INCREASE OR DECREASE IN SUBJECT ENROLLMENTS WITH THAT OF CORRESPONDING GRADE ENROLLMENTS IN PUBLIC HIGH SCHOOLS BETWEEN 1922 AND 1955[1]

	1922	1934		1949		1955	
Total high school enrollments in 1000's	2230	5621	+152.1	5399	-3.0	6584	+21.9
Enrollments							
Grade 9	869	1827	+110.2	1641	-2.9	1998	+21.7
Algebra 1	669	1281	+91.5	1042	-18.6	1205	+15.6
General Mathematics	276	417	+51.1	704	+68.1	801	+13.8
General Science[2]	408	998	+144.6	1122	+12.4	1458	+29.9
Grade 10	608	1540	+153.3	1401	-3.2	1782	+19.5
Plane Geometry	430	849	+97.4	599	-29.5	665	+11.0
Biology	196	821	+318.8	995	+21.3	1294	+30.0
Grade 11	427	1231	+188.3	1242	+0.3	1500	+20.8
Algebra 2[3]	224	430	+91.9	404	-6.0	432	+6.9
Chemistry	165	426	+158.2	412	-3.3	483	+17.2
Grade 12	326	1023	+213.8	1026	+0.9	1304	+27.2
Trigonometry[4]	34	76	+123.6	109	+43.4	170	+55.9
Solid Geometry[4]	76	110	+44.7	94	-14.5	149	+58.5
Physics	199	353	+77.4	292	-17.2	303	+3.7

[1] Figures for total high school and grade enrollments are taken from Table 17. In all cases, except the two algebras and the two geometries in 1922, the subject registrations were calculated from data in Table 18. In 1922 algebra 2 registrations were about 25% of all algebra students (see page 93). In 1928 and 1934 plane geometry was 88% of all geometry registrations (BS 1926-28, pp. 1065-68, and *Bulletin 1938 No. 6*, pp. 46-48.) The same percentage was assumed for 1922. In 1949 and 1955 comparable percentages were 88 and 88 respectively. But see Note 4 below. For possible different enrollments in 1955 and resulting percentage changes, see Appendix G, Note 11.

[2] The figures for 1955 were based on the percentage estimated by the writer in Table 18. See Note 6, Table 18.

[3] In 1949 and 1955 algebra 3 figures were not included. It could not be determined whether they were included in the other two years or not.

[4] Trigonometry and solid geometry are primarily one-semester courses and are usually offered twice each academic year. If the situation in 1954-55 is typical, enrollments in the second semester are smaller than those in the first. In the fall of 1954, 7.4% of the students in grade 12 studied trigonometry. After adjustments were made for drop-outs, registrations in the second semester brought the total up to 170,000, which was 13.0% of grade 12. (*Pamphlet No. 118*, p. 17). Registrations in solid geometry, however, were not adjusted for second-semester additions, according to the writer of *Pamphlet No. 118*. In the fall of 1954 the registrations amounted to 6.5% of grade 12. If they had been adjusted for second-semester additions, it is estimated by this writer that registrations for the year would have totaled 149,000. In making the estimate it was assumed that the adjustments would have been comparable to those in trigonometry. The following proportion, therefore, was set up: 7.4: 13 as 6.5: X. This gave 11.4% for X. This percentage was applied to the enrollment in

grade 12 and yielded 148,656. This figure, rounded off to 149,000, is used in this table instead of the figure 85,000 given in *School Life* (June 1956), p. 6. The writer does not maintain that it is absolutely accurate, but simply that it is much closer to the actual registrations in solid geometry than 85,000. The official estimate was 147,000 (Pamphlet No. 120).

although subject registrations by grade increased, among these four subjects in 1955 the numbers in algebra 1 and plane geometry were considerably smaller than they had been in 1934. Algebra 2 had made a slight gain, but general mathematics had almost doubled.

The total high school and grade enrollments increased between 1922 and 1934, decreased between 1934 and 1949, and increased between 1949 and 1955. The last table shows how these enrollment fluctuations compared with registrations in all courses in mathematics, and in science.

This table reveals several instances of a development that is very rare, if not unique, in high school history. Between 1922 and 1934 enrollments in two subjects, biology and chemistry, increased at a more rapid rate than high school enrollments. Biology and general science increased at a more rapid rate than enrollments in their respective grades.

In the next period, 1934 to 1949, enrollments in five subjects—algebra 1, plane geometry, algebra 2, solid geometry, and physics—decreased more rapidly than high school enrollments. Of these algebra 1 and plane geometry decreased more rapidly than their respective grades; the other three, and chemistry, decreased, even though their grades showed slight increases. General mathematics, general science, and biology showed increases while their grades decreased; trigonometry had a much larger proportionate increase than grade 12.[15]

Between 1949 and 1955 enrollments again increased. Only four subjects, however, increased more rapidly than enrollments in high school and in their respective grades—general science, biology, solid geometry, and trigonometry.

Throughout the entire period, 1922 to 1955, four subjects showed continuous increases. Two of these, general mathematics and general science, were in grade 9. One was in grade 10—biology; and one, trigonometry, was in grade 12. Three other subjects, in addition to these four, had larger registrations in 1955 than in 1934—solid geometry, chemistry, and algebra 2, but the gains in algebra were fractional.

It is interesting to note that between 1922 and 1949 grade enrollment gains were consecutively and progressively greater from grade 9 through grade 12. This was true also in the period between 1934 and 1949 when the loss in grade 9 was proportionately greater than the loss in grade 10, and the gain in grade 12 was proportionately greater

than the gain in grade 11. The breaking of this pattern between 1949 and 1955, when the gain in grade 9 was proportionately greater than that of grade 10 and of grade 11, suggests that the estimates in 1955 were slightly wrong, either for grade 9 or for grade 11, or possibly for both. The gains for 9 were probably a little too great, and for 11, a little too small.

A comparison of this table with Table 18 shows that the decreases in subject percentages by grade between 1934 and 1949 *were accompanied by decreases in actual subject enrollments for the first time in the history of the high school curriculum.* This fact gains added educational significance because the increases in enrollments by grade were proportionately greater for grade 10 than grade 9, for grade 11 than grade 10, and for grade 12 than grade 11. As students remained longer and longer in high school, proportionately fewer and fewer of them studied the advanced subjects taught in the upper grades. This tendency was apparently checked in 1955 as compared with 1949. If enrollments in the upper grades, however, continue to increase more rapidly than those in grades 9 and 10, more students must enroll in algebra 1 before sizeable increases can be expected in plane geometry and algebra 2. These two courses, beyond question, are the feeding ground for solid geometry and trigonometry, and most likely for physics. Adequate preparation in these three subjects, in turn, determines to a large extent the number of college majors in these and related fields. And from the college majors must come the trained personnel who go into business and industry, private and governmental, and into graduate schools for the additional training necessary to meet the needs and requirements for teaching and for leadership in scientific activities.

This interlocking relationship between lower-and-upper-level courses and between high school and college is plainly evident in many other fields. Although the rise of general mathematics undoubtedly contributed to the declining enrollments in algebra 1 and therefore, in plane geometry and algebra 2, there were other influences at work. The period after 1910, and particularly after 1922, as the tables in Chapter IV show, was marked by rapid proliferation of a wide variety of courses. Many of these did not attain great student strength, but their very numbers helped to spread their appeal. In general, only required courses managed to survive such divisive onslaughts with any success, and even these showed signs of diminishing compulsion in the upper grades. English is the best example. As a "required" subject, it offers a forceful contrast to foreign languages.

TABLE 20

ENROLLMENTS IN ENGLISH AND IN FOREIGN LANGUAGES IN PUBLIC HIGH SCHOOLS EXPRESSED AS THE PERCENTAGE OF ENROLLMENTS IN THE GRADE IN WHICH THEY ARE USUALLY OFFERED: 1933-34 TO 1954-55[1]

		1934[2]			1949[3]			1955[4]		
Total English in 1000's		6621			6399			6584		
		5089	90.6		5016	92.8		6162	93.7	
Course	Grade									
I	9	1696	92.8	33.3	1664	95.3	31.2	1900	95.1	30.8
II	10	1430	92.8	28.1	1397	93.7	27.8	1684	94.5	27.3
III	11	1165	94.5	22.9	1198	96.4	23.9	1493	97.5	24.2
IV	12	798	78.0	15.7	856	83.4	17.1	1095	84.0	17.7
Total Foreign Languages in 1000's		1897	35.5		1165	21.0		1357	20.6	
All Foreign Languages										
I	9	1058	57.9	52.9	647	39.4	55.5	758	37.9	55.8
II	10	727	47.2	36.4	419	28.1	35.9	484	27.2	35.7
III	11	160	13.0	8.2	80	8.4	6.9	98	8.5	7.2
IV	12	48	4.7	2.4	19	1.9	1.7	16	1.2	1.2
Total Latin in 1000's		802	16.0		422	7.8		454	8.9	
I	9	460	25.2	51.0	236	14.4	55.9	257	12.8	56.5
II	10	338	21.9	37.5	156	10.4	36.9	172	9.6	37.8
III	11	71	5.8	7.9	23	1.9	5.4	21	1.4	4.6
IV	12	33	3.2	3.5	7	0.7	1.7	5	0.4	1.1
Total French in 1000's		611	10.9		255	4.7		369	5.6	
I	9	315	17.2	51.5	134	8.2	52.6	201	10.1	54.4
II	10	224	14.5	36.7	91	6.1	35.6	128	7.2	34.7
III	11	61	4.9	10.0	25	2.0	9.9	35	2.3	9.4
IV	12	11	1.1	1.7	6	0.5	2.0	6	0.5	1.6
Total Spanish in 1000's		350	6.2		444	8.2		481	7.3	
Course	Grade									
I	9	205	11.2	66.4	254	15.6	67.1	272	13.6	66.6
II	10	119	7.7	34.1	156	10.6	35.2	165	9.3	34.4
III	11	22	1.8	6.2	29	2.3	6.4	36	2.5	7.9
IV	12	6	0.6	1.3	6	0.6	1.3	5	0.6	1.1
Total German in 1000's		133	2.4		43	0.8		53	0.8	
I	9	78	4.3	66.6	23	1.4	62.5	29	1.4	54.3
II	10	45	2.9	34.1	16	1.1	38.1	19	1.1	35.9
III	11	6	0.6	6.7	4	0.3	8.5	5	0.3	8.9
IV	12	-1	---	0.7	-1	---	0.9	-1	---	0.9

[1] The figures under the dates give the total high school enrollment to the nearest thousand. The figures underscored, as indicated, give the total enrollment in English, in all foreign languages, and in each language separately, in the same manner. The corresponding percentages, based on the total enrollment, are underscored. The other figures give the field or subject enrollments in each grade according to the year of the course. The corresponding percentages are in the column next to the figures, and show the proportion of grade enrollments in each year of each subject. Percentages in the adjoining column show the proportion of language enrollments in each year of the four-year language sequence. For enrollments by grade in each year listed, see Table 17 above, or Appendix C. The rounding off of decimals occasionally causes the sum in the second percentage column to fall 0.1 below 100.0%.

[2] In this year enrollments in each of the four regular classes in English and in foreign languages were broken down for the first time. By dividing the total English or foreign language enrollments into each of the course enrollments (I through IV), the proportion of the total enrollments in each course enrollment was determined. In each of the five subjects, as it happened, many students could not be classified in one of the four courses. In English, for example, 3,775,051 students were enrolled in English I through IV. Of these, enrollments in English I constituted 33.3%, in English II, 28.1%, etc., as shown in the table. There were 282,691 "undesignated" students, however, and 13,352 in half-year courses, that had not been included in the English enrollments just given. All regular English enrollments, therefore, totaled 4,071,094. Without any possibility of verification it was assumed that the unclassified students were divided in the same way as those in classes I through IV. But the English enrollments were from schools that represented only 80% of the total high school enrollment in the country. The correction of 4,071,094 for 80% gave 5,088,867 for the total English enrollment. The English I, English II, etc., percentages were then applied to this total. The appropriate products were then divided by enrollments in the corresponding grade — the total high school enrollment and enrollments in each grade were also corrected for 80%—and yielded the percentages shown. The same procedures were used for each of the four languages. For the 80% "correction," see *Bulletin 1938, No. 6*, p. 9 (repeated in BS 1948-50, Ch. 5, pp. 5, 16, 27). For grade distribution, see Appendix G, Table 86; for subject enrollments, *Bulletin 1938, No. 6*, Tables 1, 2, and 3. For subject percentages in other English subjects, see Chapter IV, Table 5.

[3] BS 1948-50, Ch. 5, Tables 3 and 7.

[4] Data for foreign languages were taken from PMLA, pp. 52-58. On the basis of figures given, the percentage of total enrollments in all languages, and in each language separately, was determined for courses I through IV, as shown in the table. The language enrollments and percentages in the survey were based on a total enrollment of 4,520,505 in the schools covered. Of these, 6.9% were enrolled in Latin, 5.6% in French, etc., as indicated in the table. The writer applied these percentages to the total high school enrollment for 1954-55, estimated by Foster and Hobson (*School Life*, May 1955), and to the results, the percentages for Latin I, French I, etc., referred to above. These results were then divided by the enrollments in grade 9, grade 10, etc., as estimated by Foster and Hobson, for the percentage of grade enrollments in each language course, as shown in the table.

Although no data were available on English for this year the writer estimated enrollments in the subject as 93.7% of the total high school enrollment as forecast by Foster and Hobson (*School Life*, May 1955). He then estimated the percentage of total English enrollments in English I, English II, etc. These percentages gave the figures for those enrollments which, in turn, yielded the appropriate grade percentage in each course. For possible different enrollments and resulting changes in grade percentages of foreign languages, see Appendix G, Note 11.

This table should be compared with Table 18 for percentage trends, and with Table 19 for enrollment trends. It shows the same general characteristics of both. Actual subject registrations decreased between 1934 and 1949, but increased between 1949 and 1955. In English, however, the percentage of total registrations and of those by grade also increased, except in English I between 1949 and 1955.[28] If this is substantially correct, it would indicate that English is be-

coming more and more a required subject for all four of the high school years.

Nothing better illustrates the influence of the elective system on enrollments than the changes that have taken place in the position of foreign languages in the high school curriculum. More than any subjects, they show the effects of decreasing enrollments in a four-year sequence in which each higher course is dependent upon the one immediately preceding it. Like most of the other cumulative subjects, increasing enrollments and decreasing percentages went hand in hand through 1934. When the two statistical elements both went in the same direction between 1934 and 1949, the drop in foreign languages was more drastic than that of any other subject-matter field.

This drop was approximately 42% in all foreign languages. By courses it was progressively larger for each consecutive course. In those of the first year it was 38%; of the second year, 42%; of the third year, 52%; of the fourth year, 60%.

Three of the languages followed this pattern in varying degrees. The overall decrease in Latin was 53%. Latin I decreased 49%; Latin II, 54%; Latin III, 68%; Latin IV, 79%. For French the overall decrease was 58%; for French I, 57%; French II, 59%; French III, 59%; French IV, 54%. In German the overall decrease was 68%; in German I, 70%; German II, 64%; German III, 33%. In German IV there was a negligible increase. In contrast to losses in each of these Spanish increased 27% between 1934 and 1949. Spanish I increased 24%; Spanish II, 31%; Spanish III, 32%; Spanish IV, 20%."

It is interesting to note that in all languages combined and in Latin the loss in the second year was the same or close to the overall loss. In French the same thing was true in French I and in French II. In German, German I was closer than German II. In Spanish the increase in Spanish II was closer to the overall increase than Spanish I. In each of the languages and in all languages combined, it is also noteworthy that the proportion of enrollments in the second-year course to total enrollments was more uniform and changed less than the proportion in any other year. These facts, together with the tremendous drop after the second-year course, emphasize the strategic importance of second-year language study.

The developments between 1949 and 1955 bear out this conclusion. In this period registrations in all languages combined increased 14%. The increase in Language I was 15%; in Language II, 13%; in Language III, 24%. But in Language IV there was a 14% decrease.

Among the separate languages there was considerable variation.

The overall increase in Latin was 8%. Latin I increased 9%; Latin II, 10%. Latin III, however, decreased 9%; and Latin IV, 29%. In French the overall increase was 45%. French I increased 50%; French II, 41%; French III, 40%; French IV, 29%. In Spanish the overall increase was 8%. Spanish I increased 7%; Spanish II, 6%; Spanish III, 31%. Spanish IV, however, decreased 16%. In German the overall increase was 23%. German I increased 26%; German II, 16%; German III, 25%. German IV remained about the same.

In this period, although there was not the same relationship between increases in second-year courses and total increases as in the preceding period, the proportion of second-year to total enrollments remained remarkably consistent. The tremendous drop after the second year of study decreased slightly in Spanish and German, but increased slightly in Latin and French.

Between 1934 and 1955 developments in English and in foreign languages were in striking contrast. In 1934 enrollments in English I and II constituted 61% of all enrollments in the four regular English courses. In 1955 that proportion had dropped to 58%. In 1934 enrollments in Language I and II constituted 89% of all foreign language enrollments. In 1955 that proportion had reached approximately 92%, with step-ladder variations among the four languages—89% for French, 90 for German, 91 for Spanish, and 94 for Latin. In effect each language had become a two-year instead of a four-year sequence.

This change, which began before 1934, points once more to the second-year course as the vital spot in all foreign language study. This is made clear by another contrast with English.

Enrollments in English I, as Table 20 shows, outnumber those in Language I more than two to one. Almost nine out of ten students in English I will go into English II, if the 1955 situation has continued, and nine out of ten of those, into English III. Almost two out of three students in Language I will continue into Language II, but only one out of five in Language II will continue into Language III. Comparable figures for the separate languages show, in order, two out of three, and one out of eight in Latin; in French, almost two out of three, and three out of eleven; in Spanish, three out of five, and a little more than one out of four; in German, two out of three, and a little more than one out of five. Fifty-seven out of a hundred students in English I will continue into English IV. Two out of a hundred in Language I will continue into Language IV. In Latin, Spanish, and German comparable figures for each are not quite two; in French, three.

Although the numbers are considerably smaller, the *proportion* of students in the first year of a foreign language who continue into the second year compares favorably with continuation from English I into English II. The great differences come after the second year, when the proportion of those continuing foreign language study takes such a decided drop.

In mathematics, although the decided drop seems to come after algebra I, this is by no means certain. The reason for the uncertainty is the flexibility of the mathematical sequence, which permits algebra I to be followed by plane geometry or algebra II. The findings of a special study on mathematics may throw some light on this complicated problem.

In 1952-53 it was estimated that 1,135,800 students were enrolled in algebra I throughout the United States. Of these 76% were in grade 9, 20% in grade 10, 3% in grade 11, and 1% in grade 12.[28] In that same year, it is estimated, 559,000 students were enrolled in plane geometry, of whom 64% were in grade 10, 26% in grade 11, 8% in grade 8, and 2% in grade 9. Estimates for algebra II gave 334,000, of whom 30% were in grade 10, 51% in grade 11, 17% in grade 12, and 1% in grade 9.[29] On the basis of these figures there is only one valid comparison that can be made: the number of students in grade 9 enrolled in algebra I as compared with the number of students in grade 10 enrolled in plane geometry and algebra II.[30] In grade 9 the number of students in algebra I was 863,208. In grade 10 the number enrolled in plane geometry was 357,880 and in algebra II, 90,000. The total of these two—448,000—constituted 52% of grade 9 enrollments in algebra I.

Since these figures were for the same year, they do not indicate what percentage of students who studied algebra I in grade 9 continued with plane geometry and algebra II the following year in grade 10. Neither do they make allowance for drop-outs between grades 9 and 10, or failures in algebra I. Nevertheless they probably make it reasonably safe to say that about one out of two students who study algebra I in grade 9 will continue with plane geometry or algebra II in grade 10.

The next sequence involves students in grade 11 who study one of these two subjects, or possibly both. Again, no allowance can be made for drop-outs or failures. It is merely assumed, without any possibility of proof, that a student in either subject in grade 10 would not be in that same subject in grade 11. From the percentages given above, in 1952-53, grade 11 students of plane geometry totaled 145,300;

The overall increase in Latin was 8%. Latin I increased 9%; Latin II, 10%. Latin III, however, decreased 9%; and Latin IV, 29%. In French the overall increase was 45%. French I increased 50%; French II, 41%; French III, 40%; French IV, 20%. In Spanish the overall increase was 8%. Spanish I increased 7%; Spanish II, 6%; Spanish III, 31%. Spanish IV, hnwever, decreased 16%. In German the overall increase was 23%. German I increased 26%; German II, 16%; German III, 25%. German IV remained about the same.

In this period, altbougb there was not the same relationship hctween increases in second-year courses and total increases as in the preceding period, the proportion of secnnd-year tn tntal enrollments remained remarkably consistent. The tremendous drop after the second year of study decreased slightly in Spanish and German, hut increased slightly in Latin and French.

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The next sequence involves students in grade 11 who study one of these two subjects, or possibly both. Again, no allowance can be made for drop-outs or failures. It is merely assumed, without any possibility of proof, that a student in either subject in grade 10 would not be in that same subject in grade 11. From the percentages given above, in 1952-53, grade 11 students of plane geometry totaled 145,300;

of algebra II, 170,300. The combined figures—310,000—constituted 70% of plane geometry and algebra II enrollments in grade 10. On this basis, it seems reasonably safe to say that seven out of ten students who studied plane geometry or algebra II in grade 10 will continue with the other subject in the sequence in grade 11. This compares very favorably with the nine out of ten students who will go from English II to English III, and contrasts sharply with the two out of ten who will go from Language II to Language III.

The final sequence, trigonometry and solid geometry in grade 12, presents complications similar to those already mentioned. In 1952-53, it is estimated, approximately 100,000 students were enrolled in each of these subjects, which are predominantly one-semester courses. Of the trigonometry enrollments about 83%—or 83,000—were in grade 12, and of those in solid geometry, about 78%—78,000." The total—161,000—constitutes 51% of registrations in plane geometry and algebra II in grade 11. On this basis, about one out of two students in plane geometry or algebra II in grade 11 will continue into trigonometry and solid geometry in grade 12.

These figures, uncertain though many factors are, probably give a more realistic picture of the situation in mathematics than do those in Tables 18 and 19. Although they were based on the study of conditions in a relatively small number of schools for only one year, the schools were carefully selected by type, size, and location. Even if conditions have changed in the period between 1952-53 and 1954-55, the figures serve to emphasize this fact: enrollments in a given course, expressed as the percentage of pupils in the grade where the course is usually taught, do just that and no more. They cannot show how many students from that grade were actually in the course. For that reason they cannot be used to predict how many students in a given course in a given grade will study the next course of the sequence in the next grade. Only a special study of the kind illustrated above can give that kind of valuable information.

Table 20 above is a good example of the difference between the two kinds of data just mentioned. Since English is becoming more and more a required subject in each of the four high school years, the sequence of English I, English II, etc., requires that a student follow it in that order. Although failures occur, the continuation rates from one course to the next have a more realistic relationship to corresponding grade enrollments than have any other subject-matter sequences.

In foreign languages a completely different situation has developed.

They, too, must be studied in proper sequence, but most students end their language work after the first two courses. If they take up a second language they ordinarily do so while they are in grades 11 and 12. Although their number is undoubtedly small, their presence in courses I and II, usually offered in grades 9 and 10, makes the relationship between grade enrollments and corresponding course registrations somewhat unrealistic. In this respect, cross-grade registrations in language courses are similar, though less extensive, to those in mathematics. Since the second year for second-language students would coincide with their senior high school year, their graduation tends to increase the big drop in registrations between the second- and third-year of all language courses.

Tables 18 and 20 could not of course take any of these factors into account. They simply show course registrations as a percentage of enrollments in the grade in which the course is usually taught. Since all percentages are derived in the same way, they have some value for marking the successive changes that have taken place at various levels in the subjects listed. For the years 1934 through 1955 Table 20 goes one step beyond Table 18 and adds actual enrollments. Table 19 supplements Table 18 in this respect and goes one step beyond Table 20 by adding percentages to show increase or decrease in course or subject registrations during the twenty-one-year period. Similar data for the courses in Table 20 are given in the text.

The actual enrollment figures, together with the percentages to indicate the extent of increase or decrease, are of some interest in themselves. But they also suggest an important question: Do they have any value for predicting an increase or decrease in the number of high school students who may specialize in certain subject-matter fields in college? [2]

A student's program of high school studies is the result of many different factors: subjects available, college entrance or school requirements, personal inclination, parental and community influence, and the like. But what about the students whose programs, whatever the reasons, include four years of a foreign language, or chemistry and physics, or trigonometry and solid geometry? Does the increase or decrease in the number of registrations in these subjects have any bearing on the number of college students who major in these and related fields?

As a companion to Tables 19 and 20 and as an aid to predictive analysis, the table below lists the number of undergraduate majors in certain subjects between 1947-48 and 1954-55.

TABLE 21

COLLEGE MAJORS IN CERTAIN SUBJECTS AND SUBJECT-MATTER FIELDS BETWEEN 1947-48 AND 1954-55[1]

	1948	1950	1952	1953	1954	1955
Total number first degrees in 1000's	272	434	332	305	293	287
Physics	2120	3414	2247	2005	1852	1996
	0.78	0.78	0.68	0.66	0.67	0.88
Chemistry	7429	10619	6819	5959	5781	5920
	2.7	2.4	2.1	1.9	2.0	2.1
Other physical sciences[2]	6169	10372	3089	2466	2137	2600
	1.9	2.4	0.03	0.84	0.73	0.81
Biology	6739	10428	6960	5959	5847	5483
	2.5	2.3	2.1	1.9	2.0	1.9
Other biological sciences[3]	5852	6994	4236	3748	3518	3557
	2.2	1.6	1.3	1.3	1.2	1.2
Total sciences	27,415	41,827	23,351	20,136	19,246	18,566
	10.1	0.7	7.0	6.6	6.3	6.6
Mathematics	4266	6392	4721	4396	4090	4034
	1.6	1.5	1.4	1.4	1.4	1.4
Engineering[4]	31086	52246	30548	24189	22329	22589
	11.4	12.0	9.2	7.9	7.6	7.9
Business and commerce[5]	38371	72137	46683	40706	40944	41655*
	14.9	16.8	14.1	13.3	14.0	14.5
Other applied social sciences[6]	3705	9014	13068	6001	7647	8057*
	1.3	2.1	3.9	2.0	2.6	2.8
Basic social sciences[6]	29560	43676	31199	28918	27774	27666
	10.8	10.1	9.4	9.5	8.5	0.6
Education[7]	29694	46635	62951	61520	66817	53254*
	10.8	10.7	18.9	20.2	19.4	18.5
Foreign Languages (all)	4241	5160	4418	4068	3793	3546
	1.5	1.2	1.3	1.3	1.3	1.2
Classical (Latin and Greek)	498	671	683	562	571	512*
	0.18	0.15	0.21	0.18	0.19	0.18
French	1281	1473	1385	1202	1268	1279
	0.47	0.34	0.42	0.39	0.43	0.45
German	334	540	415	381	327	315
	0.12	0.12	0.13	0.12	0.11	0.11
Spanish	1827	2132	1605	1438	1210	1206
	0.67	0.78	0.48	0.47	0.41	0.42
Russian	7	36	43	54	68	60*
Others	294	306	287	431	349	176
History[8]	9245	13567	10216	9576	9385	9540*
	3.3	3.1	3.1	3.1	3.2	3.3
Economics[8]	9002	14573	8595	7313	6728	6364
	3.3	3.4	2.6	2.4	2.3	2.2
Public Administration		273	297	309	383	386
English[8]	12614	17246	14087	12667	12566	13099*
	4.6	4.6	4.3	4.1	4.3	4.6

[1] All figures were taken from *Earned Degrees* (See Appendix A) for the year indicated. The figures under the dates represent to the nearest thousand the total number who received their first undergraduate degree in a given year, i.e., B.A., B.S., C.E., etc. Those receiving graduate degrees—M.A., Ph.D., Ed.D., and the like, were not included. The other figures *show the actual number* and percentage of those who received their first degree with a major or specialization in the subjects or subject-matter fields indicated. The figures underscored show the largest number recorded during the seven-year period. Those marked with an asterisk had an increase in 1955 over 1948. For the sake of interest and comparison many subjects and fields were added for which high school figures and subjects would have no predictive value. Comments will be made about some of them below, and in a few cases additional high school information given.

In 1955-56 the total number of first degrees was 311,298. Because of a change in the method of tabulation, statistics in some of the fields are not comparable to those of preceding years. Thus, in Table 6 (old method) the biological sciences show a decrease in 1955-56 over 1954-55, but in Table 4 (new method), a sizeable increase. Physical sciences are the same in both. Physics increased to 2,335 in number and to 0.75 in percentage; chemistry increased to 6,178, but its percentage decreased to 1.99. Mathematics, the same in both tables, increased to 4,660 and 1.48%.

[2] Astronomy, geology, metallurgy, meteorology, and a number of physical sciences not identified. All of these had slight increases in 1955-56.

[3] Anatomy, bacteriology, biochemistry, botany, entomology, physiology, zoology, and a number of biological sciences not identified. Of these only bacteriology and zoology increased in number in 1955-56; all decreased in percentage.

[4] All engineering fields were grouped together. In 1955-56 the number increased to 26,312 and the percentage to 8.45.

[5] In addition to business and commerce (accounting, and "other"), the applied social sciences include public administration (given separately), social work, and social sciences unclassified. All except social work had numerical and percentage increases in 1955-56.

[6] Economics, history (both given separately), sociology, political science. All increased numerically in 1955-56; political science and sociology decreased slightly in percentage.

[7] It is interesting to note that Education was the only separate major field that did not reach its peak in 1949-50 when college enrollments and graduates reached their all-time high. Its number in 1954-55 as compared with 1947-48 was proportionately much greater than that for any other subject or field. In 1955-56 the various entries in this field were considerably changed. There was an overall increase in number but a slight decrease in percentage.

[8] Undergraduate majors in history, regardless of college enrollments or the number of graduates, make up slightly more than 3% of the graduates; those in economics, slightly more than 2%; and those in English, about 4.5%. In 1955-56 the number of majors in each of these subjects increased slightly, the percentages remained practically the same. It seems clear that high school enrollments in these subjects have little influence in college.

This table gives a very good cross-section of under-graduate studies and majors in recent years. Between 1947-48, the first year such statistics were made available in such detail, and 1949-50, returning veterans brought college enrollments and graduating classes to an all-time high. Although there was a steady decrease between 1950 and 1955, each class in this period was larger than any during the pre-war years. Many high school graduates entered college also, directly after graduation, during all these years. While the presence of the veterans, whose college education has been delayed, may weaken the predictive value of high school enrollments in mathematics, science, and foreign languages, nevertheless certain comparisons may be made and some tentative conclusions drawn from them.

Between 1934 and 1949, as Tables 17 and 18 show, high school

enrollments decreased, and many subject registrations by grade decreased in actual numbers and in percentages. Neither table could show the fluctuations of enrollments in grades 11 and 12. Enrollments in those grades increased to their peak between 1934 and 1941. Between 1941 and 1947 there were variations down and then up to a second peak. In 1947-48 grades 11 and 12 were slightly larger than those grades in 1948-49.[24] This fact is important because certain subject registrations by grade were smaller in actual numbers and in percentages in 1949 than in 1934.

In 1947-48, it is estimated 28.4% of 1,030,000 high school seniors, or approximately 202,500 students, studied physics.[25] One year later approximately 292,000 students were enrolled in physics (Table 19). Since the members of these two classes who entered college immediately would theoretically have graduated in 1952 and 1953 respectively, the college class of 1952 might be expected to have a few more majors in physics than the class of 1953. As Table 21 shows, it had 242 more.

In 1947-48, to take another example, there were 491,000 high school students of chemistry.[26] Subject registrations a year later, in 1948-49, totaled 412,000 students (Table 10). The members of these two classes who entered college after their senior year would theoretically have graduated in 1953 and in 1954 respectively. In line with predictive expectations, chemistry majors in the class of 1953 outnumbered those in the class of 1954. Although the difference was smaller than might have been anticipated—168 (Table 21)—the likelihood that most students were in high school a year after they had studied chemistry was a possible factor.

Other physical science majors in college, fields for which high school registrations in chemistry and physics might be predictive, showed the same developments as majors in chemistry and physics. The number of such majors was larger in 1952 than in 1953 and in 1953 than in 1954. This was also true in biology and in the other biological sciences (Table 21).

It cannot of course be proved that the high school figures for 1947-48, on which these comparisons and predictions rest, were absolutely accurate. The differences between the number of college majors in physics and particularly in chemistry were somewhat less than might have been expected. If it was justifiable, however, to add majors in the other fields cited, the potential predictive value of registrations in high school chemistry and physics together might be considered fairly strong.[27]

A similar analysis for mathematics and foreign languages is made more difficult by the lack of any special studies to fill the gap between the high school curriculum surveys of 1933-34 and 1948-49. Nevertheless, as Tables 19 and 20 make plain, registrations in all mathematics courses, except in general mathematics and in trigonometry, decreased between 1934 and 1949, and in all language courses except Spanish. It may not be illogical, therefore, to assume that enrollments in these courses—exclusive of the exceptions just noted—followed the pattern of chemistry and physics in 1947-48 as compared with 1948-49. If the assumption is justified, there should be more college majors in mathematics, Latin, French, German, and possibly in engineering, in 1952 than in 1953, and possibly more in 1953 than in 1954. This was true for mathematics, engineering, and German. Latin and French had more in 1952 than in 1953 or 1954, despite a slight increase in 1954 over 1953 (Table 21).[27] Spanish, contrary to expectations, followed the pattern of German.

Two contradictory elements for predictive purposes in mathematics and engineering—the decrease in plane and solid geometry and algebra II registrations as against an increase of those in trigonometry—illustrate the complex nature of the predictive process. The decreases in solid geometry and algebra II offset the increases in trigonometry by approximately 7,000 students. On this basis, perhaps decreases in the number of college majors in mathematics and engineering should have been expected. On the other hand, at least in engineering, it is quite likely that peak enrollments in that broad field in 1949, 1950, and 1951, caused some concern about future job opportunities and intensified competition. It is noticeable that the engineering field between 1952 and 1954 decreased not only in numbers but in percentages as well. The number in mathematics also decreased, but the proportion to all majors remained approximately the same in each of those three years.

Among the foreign languages the tremendous enrollment drop in Latin, French, and German between 1934 and 1949 undoubtedly had reduced college majors in those subjects long before 1947-48. The continued high school decrease assumed for 1947-48 and 1948-49 would have been reflected, if at all in college, only in the classes of 1952 and 1953, when the numbers involved had become even more relatively insignificant.

The high school developments in Spanish, which ran contrary to expectations in college, illustrate an important factor in all language study. Although it is possible for a student to begin a language in

college and major in it, the amount of work this would require in the last two years adds considerably to the difficulty. Most language majors come into college with at least two years of a language, and more often with four. Sometime before 1948-49 Spanish became the most popular foreign language in high school. Although increases took place in third- and fourth-year courses, the greatest increases were in the courses of the first two years. More students were entering college with some knowledge of Spanish than ever before, but that knowledge was rusty from two years' lack of use. This would make it necessary in most cases to shift to another foreign language, even to satisfy a two-year requirement for the bachelor of arts. As Table 21 shows, Spanish majors were about 50% larger than those in French between 1948 and 1950. That gap had narrowed considerably by 1952, and by 1954 French had passed Spanish for the first time. An additional contributing factor in this development may be read in Table 20.

Between 1934 and 1949 all enrollments in French decreased markedly, including those in French III and IV. During the same period all enrollments in Spanish had increased markedly, including courses of the last two years. In 1934, however, French III enrollments were nearly three times as large as Spanish III, and French IV enrollments were a little over twice as large as Spanish IV. Although Spanish had gone ahead in the last two categories by 1949, during most of the period French was probably in the lead or at least equal to Spanish. In 1949 Spanish III was considerably ahead of French III, but Spanish IV was only slightly ahead of French IV. By 1955, with general increases in both languages, Spanish III's lead over French III had been reduced, but French IV was ahead of Spanish IV. This development, which had started in high school after 1948-49, showed predictable results in college. In 1955, and even in 1954, French majors outnumbered those in Spanish, and French majors in 1955 had increased over those in 1954.

The same predictable results also worked out for Latin. Between 1949 and 1955 enrollments in Latin III and IV decreased (Table 20). There was a smaller number of classics majors in 1955 than in 1954 (Table 21).*

The proportion of second-year enrollments to total enrollments, as pointed out earlier in this chapter, remained remarkably uniform in all languages.* But the increase in the proportion of the first-year course to all courses, between 1934 and 1955, was greater for Latin than for any other language. By 1955, as a result of the de-

creases in the proportion of Spanish I, it was about the same for Latin and Spanish. It is extremely doubtful if this means, as was suggested above for Spanish, that more students are taking up Latin as a second language. The numbers involved do not support such an inference. What it does mean, however, is that, fewer though they may be in the aggregate as compared with the numbers immediately before and after 1934, more students are going into college ill prepared to continue in Latin. Because of the lapse of two years' time their knowledge of Latin has become dim with disuse. Far from being qualified to major in Latin, most of them are compelled to shift to another language to satisfy requirements for the bachelor's degree. This is an important contributing factor in the decline of Latin majors, just as it is for Spanish.

In proportion to the number of high school students enrolled in it, and particularly in courses III and IV, German has far more college majors than any other foreign language. Although the numbers involved are small, both in high school and in college, the decrease in German IV between 1949 and 1955 produced the expected results in college. German majors were fewer in 1955 than in 1954 (Table 21).

As Table 19 shows, enrollments in every mathematics and science course in high school increased between 1949 and 1955. College majors in every related subject and field increased in 1955 over 1954, except in biology and in mathematics.

Although the greatest high school increases were in solid geometry and trigonometry, their predictive value may be greater for engineering than for mathematics proper.[20] The increases in algebra II and plane geometry were comparatively slight, and their principal grade locations, 11 and 10 respectively, probably reduced their predictive value. Nevertheless recent studies have portrayed a situation in mathematics more serious than the college figures indicate.

A study published in 1954 revealed that 62% of the colleges in the country had to teach high school algebra to their entering freshmen. A year later another study gave the report of an engineering school that 72 per cent of its entering students were not qualified for the regular freshman course in mathematics.[21]

Whether the experience of the one school is typical for all engineering schools or not, the two reports supplement each other. Since all of the students had been duly admitted, presumably because they had taken the proper courses, including mathematics, with the proper grades and had been recommended by their principals, it must be

expected that a four-year integrated course of study will be developed, together with suitable textbooks and teaching methods.[22] These changes in high school will most likely cause similar changes in the lower grades and possibly in college. Undoubtedly they will bring about an increased emphasis and interest in the study of mathematics at all levels and make such study a more effective educational instrument for an ever larger number of students in our public schools.

In the field of foreign languages another approach has been made to solve the problem of declining enrollments. Within the last few years informal oral instruction, primarily in French and Spanish, has been introduced in the elementary grades. The movement has spread throughout most of the states, and preparation has begun of a series of teaching manuals appropriate to the different grade levels.[23]

How this program, if it continues to grow, will affect foreign language study in high school and college cannot yet be judged. The vast majority of language students will continue to begin such study in high school, particularly in Latin, for some years to come. As more students enter high school with previous language training, however, changes will undoubtedly occur in methods and texts for all languages, including Latin. Out of these changes will come eventually a coordinated course of language study, extending from the grades through high school into college, that will more nearly suit our educational needs as leader in the community of free nations.

Those needs will not be met by mathematics and foreign languages alone. They must be supplemented with a carefully coordinated program of science studies, on which our national security so unavoidably rests.

The subject-matter of these three fields may change and methods of instruction may vary, but within the foreseeable future we shall neglect them at our peril.

[1] All figures were calculated from data given in Ch. IV, Table 1, and rounded off to the nearest thousand.

[2] See Chapter V, for a general discussion of the *Report*, and Note 11 for references.

[3] CR 1901-05, II, p. 822; CR 1905-06, II, p. 695; CR 1909-10, II, p. 1134.

[4] CR 1909-10, II, p. 1133 (published in 1911).

[5] In Chapter IV, Table 1, its percentage was 1.9 in 1900, and 1.86, rounded off to 1.9, in 1910. In Table 17 above the slight increase in 1910 over 1900 is due to the size of grade 12, which did not increase proportionately quite as much as the total high school enrollment. For the percentages and pattern in science, based on total high school enrollments, see Chapter IV, Table 3.

[6] *Bulletin 1938, No. 6*, p. 14.

[7] BS 1926-28, p. 966.

[8] *Ibid.*, pp. 1066-67.

[9] A convenient reference for these facts is BS 1948-50, Ch. 5, Table 7.

[10] In BS 1926-28, p. 966, from which this quotation was taken, the word *geometry*, rather than *plane geometry*, was used. Since the statement came on the heels of "what portion of geometry is plane geometry," and with no mention of solid geometry in the paragraph, the reference to plane geometry seemed unmistakable. Otherwise, the statement would mean that plane and solid geometry, before 1928, were studied together as a year's course. In 1934, the first time such information was made available, registrations in plane geometry as a year-course constituted 98% of all registrations in the subject; registrations in solid geometry as a half-year course, 84% of all registrations in the subject. See *Bulletin 1938, No. 6*, pp. 47-48.

[11] In 1934 registrations in advanced algebra as a year-course constituted 68% of all registrations in the subject; in 1949, in intermediate algebra, 81%. See *Bulletin 1938, No. 6*, p. 46, and *BS* 1948-50, Ch. 5, p. 55. In 1934 advanced algebra may have included algebra 3. Since the only separate figures for algebra 3 (in the second reference, p. 57) show that it was a half-year course for 65% of the students, the presence of algebra 3 figures in 1934 would probably have increased the number of half-year students.

[12] The numbers who have studied all four sciences in the various years could not be determined. This would make an interesting and useful study—if it has not been done.

[13] According to one recent study 62% of the colleges were caught in the cycle. W. L. Williams, "What the colleges are doing about the poorly prepared student," in *American Mathematical Monthly*, 61 (February 1954) 86-88, quoted by *Dyer et al*, p. 23. In 1955 an engineering school reported that 72% of its entering freshmen had to take refresher courses in mathematics before they could do normal first-year work. *Engineering and Scientific Manpower Newsletter* No. 89 (February 14, 1956), quoted by *Dyer et al*, p. 23.

[14] In 1928 they were 76.8%, and in 1934, 74.6%. Percentages were calculated from BS 1926-28, p. 1065, and *Bulletin 1938, No. 6*, p. 46.

[15] See, however, Note 4, Table 19.

[16] The division of registrations in English I through IV in 1934, as explained in Note 1, Table 20 above, could not be made with absolute certainty. If the division for that year was approximately correct, the proportion of English I registrations decreased between 1934 and 1949, and this assumed decrease was carried through 1955 (see second percentage column in Table 20). The proportion of English II also showed a slight decrease in the whole period. Both of these developments were in contrast to increases in the proportions of English III and IV, with 1934 again as the starting point.

[17] All calculations were based on figures in Table 20. Percentages were rounded off to the nearest decimal.

[18] *Bulletin 1953, No. 5*, Tables 15 and 17.

[19] *Ibid.*, pp. 16 and 21; Tables 24 and 28.

[20] It is obviously impossible to tell from the data given how many students in grade 11 enrolled in plane geometry or algebra II might have studied the other subject while they were in grade 10, or might be studying the two concurrently in grade 11.

[21] *Ibid.*, pp. 23-26; Tables 31 and 35. The latter table shows that about 15% of trigonometry registrations were in grade 11, and about 22% of solid geometry. The remaining 2% in trigonometry were postgraduate students.

[22] See p. 106.

[23] These statements are based on statistics in BS 1950-52, Ch. 1, Table 12, reported by state systems. Enrollments based on state reports are usually larger than those based on reports from individual secondary day schools, from which subject registrations and percentages are derived. In 1948-49, for example, enrollments in grade 12 from the latter source were 1,026,000 (Table 17 or 19), or only 91.1% of the number reported in the former source, 1,126,000 (Table 12 in this note). Grade 11, to take a second example, was 98% as large. The figures were 1,242,000 (Table 17 or 19) and 1,267,000 (Table 12 in this note) respectively.

[24] The percentage was obtained from Table 4 of a special study *Bulletin 1950, No.* 9. Apparently, it was based exclusively on enrollments in grade 12 of the selected schools. This writer then applied it to the total enrollment in that grade throughout the United States as given in BS 1950-52, Ch. 1, Table 12, after it had been corrected in the way indicated in the preceding note. It was assumed that the correction necessary in 1948-49 would have been the same in 1947-48.

[25] The percentage, 39.4, was based on enrollments in grade 11 of the selected schools (*Bulletin 1950, No.* 9, Table 4.) This percentage was applied to the total enrollment in grade 11 throughout the country, after it had been corrected in the way indicated in Note 23 above.

[26] As Table 19 shows, biology was the only high school science, except general science, that had increasingly larger registrations between 1934 and 1955. Even though its high school enrollments have been consistently and considerably larger than those in physics and chemistry combined, in college, majors in the physical sciences have been consistently larger than majors in the biological sciences. High school enrollments in biology therefore would seem to have no predictive value. Since it is primarily a grade 10 subject many biology students undoubtedly study chemistry or physics before they finish high school.

[27] Majors in the classical languages (Table 21) include those in Greek and possibly those in classical archeology. High school studies, except Latin of course, and possibly history, have very little bearing on the latter two subjects.

[28] See Note 27.

[29] See the second percentage column in Table 20.

[30] See Note 26 above for a discussion of a similar situation in biology.

[31] See Note 13 above.

[32] The experiments are being conducted under the direction of a Committee on Secondary School Mathematics at the University of Illinois (*Dyer et al*, pp. 23-24). A special grant to aid in this work was made by the Carnegie Corporation. See its *Annual Report* for 1956, pp. 39-40, 60.

[33] *Status of Foreign Language Study in American Elementary Schools*, by Kenneth W. Mildenberger, published by the U.S. Department of Health, Education, and Welfare (Washington, February 1956).

CHAPTER VII

THE JANUS LOOK

No American can study the history of our public high school without a feeling of awe at its growth and a sense of pride in its accomplishments. Its development into a national institution without sacrifice of state and local control is an example of educationnl leadership that has no parallel in any other country. The simultaneous evolution of this institution's dual function as an instrument of education and an agent of social change is unprecedented even in the annals of our own democracy.

This evolution may be divided into five broad periods. Each period maintained some continuity with the past and at the same time was naturally subject to the modifying force of contemporary and often conflicting opinions. Each period, that is, in succession bore the peculiar imprint of its own times in which, consciously or unconsciously, the seeds of change were constantly being sown.

During the colonial peroid, when secondary education was considered the prerogative of a favored minority, the curriculum used was one inherited from a tradition based upon aristocratic ideas of culture and class. Granted that it was inevitable for the Pilgrims and Cavaliers to transplant the only system of education they knew, the result was in many ways grotesque. In no other phase of our history has there been a greater incongruity between the practical needs of daily life and the curriculum of secondary and higher education. What stronger contrast could there be than the multitudinous activities of a struggle with primitive nature and man and the study of Greek and Roman literature? And yet, far from being an unrelieved exercise in futility, those selfsame studies pursued from grammar school into college by successive generations helped to produce a leadership that carved national independence out of almost unyielding odds.

No man can prove that an education of this kind, limited in number of students and in subject matter, prolonged — or shortened — the struggle one agonizing whit. It is clear, nevertheless, that the restriction of educational opportunities and consequent dissatisfaction with

a curriculum geared so exclusively to the past ushered in the next phase—the founding of private academies and the introduction of subjects conceivably of more immediate and practical use.

But the private academies, despite their original aims, could not make a complete break with tradition. The classical impulse was too ingrained and the college influence too dominant in a society that continued to show at least token obeisance to the ideals of culture and discipline. Large segments of that society, however, were becoming increasingly conscious of the possible connection between education and day-to-day living. Many of the academies, founded in all parts of the country, catered to the demands for such practical subjects as English grammar, surveying, business arithmetic, bookkeeping, history, and modern foreign languages; many combined such courses with the usual Latin and Greek, and still others were merely grammar schools under the new name.

Soon after the close of the Revolutionary War the academies largely replaced the grammar schools, in name if not altogether in spirit and purpose. The birth of the Republic and the growth of school-age population called for more and more schools at the secondary level. The academies provided the first answer and with their more extensive and flexible curricula they became the community colleges of their day.

But a private enterprise, however dedicated to the public good, meant private control of a public enterprise that was supported primarily by tuition fees. Both of these—private control and tuition fees—eventually ran counter to the spreading idea of free elementary education, and led to the third period of development—the creation in 1821 of a new instrument of democratic education, the public high school.

In keeping with its initial purpose, to prepare youth for the practical affairs of contemporary life, the curricula of the early high school were broadly vocational in content and scope. As the movement spread from industrial centers throughout the country, however, the original intent was gradually enlarged. Public sentiment compelled high schools, as it had compelled the academies before them, to add college preparatory subjects to their curricula. Under the mounting pressure of the dual function this imposed, made more complicated by compulsory education and a rising birth rate, the high schools enlarged their curricula beyond the bounds of effective educational control and plain common sense.

This expansion was in full bloom when the Federal Department of

Education was set up in 1867. Tbrough systematized and informative publications it gradually made the American people and its leaders aware of the need for greater uniformity in subject matter and higher standards in secondary education. For the first time in our history we faced the necessity of applying to education the principle we had already learned in winning our political freedom: *uncontrolled excess leads to chaos and subsequent reform.* This realization paved the way for the fourth stage of tbe high school's development, which began with the Report of the Committee of Ten in 1894.

This Report was more than a blueprint of curriculum reform; it was also the *embodiment of the most profound, practical, and democratic philosophy of education ever enunciated in America.*

It was the most profound because it cut through the shams and shibboleths of the immediate and the practical to the basic needs of the individual and of our democratic society in the dawning world of the twentieth century. It was the most practical because it set an educational pattern that could be tailored to any high school regardless of size. It was the most democratic because it made no distinction between the educational welfare of those who were going to college and those who were not.

The essence of the Committee's philosophy may be summarized in four guiding principles: (1) The high school should specialize in broad, general education in tbe liberal arts and sciences which helped to form Western Civilization and on which man's destiny largely depends. (2) Out of the many broad fields of human knowledge, those must be selected which lay the foundation for civic and cultural development, mental and moral growth. (3) The subjects must be ones in which instruction can be given in classes graded in sequence from the elementary grades through high school, by teachers skilled in the use of methods appropriate to each level. (4) They must be subjects for which, by continuous and cooperative effort, improved texts and teaching methods can be developed and progressively kept up to date.

These precepts are as valid today as they were in 1894. It is good educational sense for our high schools to teacb what they and they alone are best able to teach. It is practical and economical not to add to the burden of tbe scbools—and of the taxpayers—an almost unlimited number of subjects many of which could be learned as well, perhaps even better, outside of school. It is democratic to make the same kind of basic education available to all, within the limits of iadividual capacity.

To translate their philosophy into action, the Committee set up a

four-track curriculum. Each track in this curriculum had graduated courses of study in five subject-matter fields: English, mathematics, foreign languages, history and government, and science. The four courses of study differed from each other mainly in two ways: in the foreign language designated (ancient or modern), and in the number of periods per week devoted to various subjects. It was contemplated that most students would graduate with four years of English and a single foreign language, and with at least three years of mathematics, science, and history and government.

For nearly thirty years the philosophy of the Committee of Ten was the predominating influence in secondary education. That influence was greatest from 1894, the year its Report was published, to 1910, but it remained strong through 1922. This is the period, it is significant to recall, when the number of high school students increased almost 1000% and the number of graduates, approximately 1200%.[1] Contrary to popular and to much educated opinion, this was *not* the period in which the majority of public high school graduates went to college.[2] Nevertheless during this period student concentration in science, mathematics, and foreign languages reached a maximum, both in percentages based on total high school enrollments and, for science, in those based on enrollments in grades in which these subjects are usually offered.[3]

At no time before or since have the high schools of this country worked with such unanimity and singleness of purpose. At no time did it seem more certain that secondary education had at last found a solid foundation of permanent value. Actual subject-matter content might change—and surely it would with new discoveries and with old interpretations revised in the light of added knowledge. New methods of teaching would surely be inevitable with advances in the field of psychology and in the embryonic science of education. To incorporate and correlate all of the myriad facets of learning and teaching into a related whole would demand new texts, but the five subject-matter fields would continue to be the *pentateuch* of the high school curriculum.

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These precepts are as valid today as they were in 1894. It is good educational sense for our high schools to teach what they and they alone are best able to teach. It is practical and economical not to add to the burden of the schools—and of the taxpayers—an almost unlimited number of subjects many of which could be learned as well, perhaps even better, outside of school. It is democratic to make the same kind of basic education available to all, within the limits of individual capacity.

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But during the very period in which the cumulative subjects in the Committee's four-track curriculum were attracting the largest proportions of students in high school history, a different philosophy of education was gaining wide support. In this philosophy education was considered not so much a training and disciplining of the mind as a process of developing social and civie awareness and responsibility. The life-adjustment theory shifted emphasis from formalized

drill to cooperative problem-solving, from subject matter to the student and his individualized needs.

Added impetus was given to these concepts by the tremendous and rapid growth of high school enrollments. More students meant more personalized differences and interests and consequently a greater number and variety of subjects to meet the greater diversity of life-adjustment demands. The attempt to meet these needs ushered in the fifth stage of high school development: over-expansion of the curriculum—for the second time.[4]

The Committee of Ten had recognized that diversity of individual interests and capacities would require different subject matter and treatment. It had provided some choice among the sciences and a few options for those whose bent or intent did not extend to algebra or ancient languages. It had not seen fit to prescribe the number of such practical subjects as business education, home economics, industrial arts, physical education and the like. The need and facilities for such activities and studies would vary wisely and decisions about them were proper matters for community judgment and local boards. The same could be said of music and art.

Nor was expansion confined to nonacademic subjects. Many new social studies were added to inculcate civic and social responsibilities. Courses in English were reorganized and special courses created, in an attempt to relate "literature and life."

Once such a movement was started it was difficult to stop. A few figures will illustrate. In 1910 there were 35 subjects in the curriculum, of which 27 were in the five academic fields stressed by the Committee of Ten. By 1922 the 27 had increased to 39, and the 8 to 29, for a total of 68. In 1934 additions were in full swing. The 39 had become 54—15 new subjects, all in English and social studies—and the 29 had become 57, for a total of 111. In 1949 the pendulum reached perhaps its widest arc. The 54 academic subjects had become 59, the nonacademic had become 82, for a total of 141, divided into some 274 different courses![5]

The effects of this expansion may be easily traced in the shifts of educational emphasis that resulted. In 1910 there were proportionately more students studying foreign languages, or mathematics, or science, or English, or social studies, than were studying all of the nonacademic subjects combined. English led the field with registrations equivalent to 114% of the total high school enrollment, mathematics came next with the equivalent of 90%; then foreign languages, with

84%, and social studies with 72. The seven nonacademic fields had the equivalent of 28%.

By 1922 the five academic fields still led, but there was a noticeable shift in the educational wind. English remained at the top with the equivalent of 83% of the total enrollment, followed by social studies with 78%. Among the three cumulative subject-matter fields, which had been significantly close together in 1910, mathematics was far in the lead with 75%, then science with 58%, and foreign languages with 55%. These three fields had suffered drastic losses on a proportionate basis, in sharp contrast with the other academic fields,[6] and in decided contrast with proportionate gains in the nonacademic fields. Chief among these was business education, which had a phenomenal increase between 1910 and 1922 from 11% to 42%. All of the subjects in the seven fields have the equivalent of 130% of the total high school enrollment.[7]

Although total losses or gains were less striking in the next period, ending in 1934, the general trend of the preceding period was maintained. Social studies made a slight gain to 79%; English, with 96%, had made a strong recovery from statistical confusion. The three cumulative subjects continued to decline: mathematics to 56%, science to 51, and foreign languages to 36. These were in sharp contrast with business education, which now enrolled 58% of the total high school. For the first time in high school history there were more students in business education subjects than in mathematics or science or foreign languages. Enrollments in the two fields of vocational and nonvocational subjects and home economics were greater than those in all foreign languages. All enrollments in nonacademic subjects, which attracted 28% in 1910, were now equivalent to 211% of the high school enrollments and considerably larger than those in mathematics, science, and foreign languages combined.

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Because of the tremendous increases in high school enrollments these shifts in educational emphasis attracted relatively little attention. Although the declining percentnges of students studying mathematics, science, and foreign languages nfter 1010 caused n vague feeling of concern among conservative educators, continuous increases in the actual numher of students in those fields seemed reassuring enough to prevent extensive alarm. After all, in 1909-10, when the equivalent of 90% of high school students studied mathematics in some form, only about 13% of the high-school age population—those 14 to 17 years old—were in high school. In 1048-49, when 55% were studying mathematics, approximately 63% of the high-school age hracket were in high school.[10]

But aside from the great increase in educational opportunities and in the holding power of the schools, there were other and perhaps more significant implications. In 1009-10 only the intellectually "elite" were in high school. It is not strange that 90% of them studied mathematics, particularly in view of the restricted curriculum. But times have changed since 1910. Our high schools have become more "democratic." It could not he expected that nine out of ten students should study mathematics, for which many of them would have slight ability and even less use. Other suhjects in the curriculum would more nearly satisfy their needs—and interests.

The contrast in actual numhers of course is rather staggering. The equivalent of ahout 800,000 studied mathematics in 1909-10; ahout 2,960,000, in 1948-49. In the latter year there were more students in aleghra 1 alone than in the entire high school in the former year, and almost as many in general mathematics.[11]

What is overlooked in all such overwhelming statistics is one very simple but crucial fact: if the equivalent of 90% of the students in 1948-49 had studied mathematics, in that year alone the equivalent of 1,900,000 more students would have been added.

After 1910, at any rate, *increasing enrollments but decreasing percentages* hecame the expected pattern in the three cumulative suhject matter fields. When foreign languages broke the pattern, with fewer students in 1948-49 than in 1933-34, there were cries of educational anguish—among language teachers and a few world-minded and culture-conscious citizens. Although mathematics also broke the pattern in the same year, this fact largely escaped attention because, except for geomctry, the record seemed to show larger suhject—and total—

enrollments in 1948-49 than in 1933-34.[13] The actual facts were somewhat different.

Between 1933-34 and 1948-49 the total high school enrollment decreased about 4%. Among the four high school grades, however, decreases took place only in grades 9 and 10; grades 11 and 12 each had slight increases. Enrollment decreases might have been expected, therefore, in the subjects taught in grades 9 and 10 but not in those taught in grades 11 and 12. Yet they occurred in all four grades. *For the first time since 1910, and probably earlier, there were decreases of enrollments in algebra 2 (grade 11), in solid geometry (grade 12) despite enrollment increases in these two grades. In the same period, decrease in algebra 1 was proportionately almost twice as great as the decrease in grade 9; decrease in plane geometry proportionately almost ten times that of grade 10.*[13]

These developments were not confined to foreign languages and mathematics; they occurred in science also. Here the contrast was equally striking. General science and biology had increased enrollments in grades 9 and 10 despite the decreases in those two grades. Chemistry and physics, on the other hand, both had decreases despite the increases in grades 11 and 12, small though they were. *For the first time since 1893-94 physics and chemistry had simultaneous decreases in enrollments and percentages.*[14] *For the first time since 1910 there were simultaneous decreases in enrollments and percentages of most of the cumulative subjects.*[15]

The reason was not simply the competition and attraction of subjects that were less strenuous in their mental demands. That had its effect. Nor was it the correlary idea that increasing enrollment meant a corresponding decrease in the average level of intelligence. That too played its part. Added to these were several other rather complex but inter-related reasons. Chief among them were the failure to develop better teaching methods and texts, the shortage of good teachers, and the gradual dissipation of a once almost evangelistic belief in the disciplinary value of education.

No other subjects in the curriculum require more thorough knowledge and teaching skill than mathematics, science, and foreign languages. But knowledge alone is not enough; teaching skill alone is not enough. The two must be combined to a high degree of excellence. Such a combination can do much to overcome the handicaps of a poor textbook, but effective teaching demands all three—expert knowledge, teaching skill, and a textbook that enhances both.

These are attributes and assets that do not come by simple chance

or divine intervention. Tn nbtain and fostcr and improve them requires constant vigilance and determined, cooperative effort on the part of professional and academic experts alikc, at all levels of our educational system.

Unbclievable at it may now seem, cooperation of this kind has never existed between teachers of arts and sciences in college and those who teacb teacher-training courses. On the contrary, such a feeling of antipathy and distrust has grnwn up that the educators of this country are virtually divided into two opposing camps, each witb its own till-death-us-do-part brand of camp fnllowers.

From the small beginning nf a few courses offered in some of the academies, the training of teachers has long been one of our most important educational aetivities. Early in the ninctecnth century, however, when the movement for such training began to gather force, the liberal arts colleges could not see beyond thcir stuffy academic fronts. In due and immediate course separate normal or training schools were established. The first in 1823 was the institutional progenitor of a lusty breed.

The breach, thus begun, has been hard to bridge. The liberal arts colleges have admitted Departments of Educeation to their cloistered circle and Schools of Education bave been set up in most universities. For all that, two vitally related educatinnal funetions for the training of teachers have been kept essentially separate. Professors of academic subjeets have tended to stress mastery of content and to deride study of methods. In their seasoned judgment, unwarped by excessive acquaintance witb teaching techniques, knowledge of subject matter is the one requisite for good teaching. If the teacber really knows the subject, plain common sense, plus the teacher's intuitive experience, will take care of teaching methods. Good teachers are born, not made.

Professors of Education, on the other hand, have tended to glorify methodology and to minimize content. Once a teacher has learned tested teaching methods in a particular subject for a particular agegroup, the application of those methods along the lines dictated by psychological research will result in good teaching. The task of the teacher is to guide the student in a learning situation which varies greatly for individuals. Since each person must learn for himself, the student is helped most, not by the teacher's knowledge of the subject, but by his knowledge of how to teach that subject.

This intramural debate has waned considerably of late and there are signs that a new era, one of cooperation, has now begun. The

teacher shortage has made it necessary to bring back or to accept for the first time many who do not meet usual professional requirements. This has happened most frequently perhaps in mathematics and science. Knowledge and enthusiasm for a subject have often proved effective substitutes for attested teaching-methods courses, and the educational heavens of the profession have not fallen! Although a millenium is not yet to be expected, there has been a slight apocalypse.

Proponents of the liberal arts and science have also begun to learn the salutary lesson that methods *are* important. Although there are other factors involved in the long continued decline in the proportion of students in mathematics, science, and foreign languages, the failure to use proper teaching methods is one of the most significant. This is not the fault of professional educators. There is little doubt that more effective teaching methods have been developed. There is little doubt also that many teachers have been unable—or unwilling—to learn them. But the leaven will spread, for new methods mean new textbooks, and new textbooks will spread the gospel among the hardened and unregenerate righteous who, perhaps more often than any others, stand in the need of prayer and repentance.

But reforms in teaching methods and texts do not stop there. Almost inevitably both point to a more fundamental change—a reorganization of the curriculum, in whole or in part. Such a change in mathematics is already under way to a limited degree in high school, and at least in prospect for the junior high school. Only within the last year or so have we learned the apparently amazing fact that principles of abstract thought and of symbolic logic, presented by competent teachers, are not beyond the interest and grasp of the average student. In time a coordinated course of study will undoubtedly result. It will extend from the lower grades through high school into college, and a special series of texts will be developed for each of the three public school levels.[16] Improved texts and teaching methods will revolutionize the study and teaching of mathematics in this country and make it an educational instrument second to none in the curriculum.

Although these results in themselves would make such steps desirable, they will be enhanced by their effect on science. Recent and recurring developments have dramatized as rarely before in intellectual history the vital connection between these two distinct but related fields. Even if the study of mathematics had no educational value as a separate discipline, its possible influence on and applica-

tion to scientific thought would make it indispensable in the modern world.

Improvements of this sort in mathematics, accomplished or planned, make parallel reforms in science all the more imperative. Indeed the rapidity with which scientific knowledge has expanded in the last decade and most likely will continue to expand complicates the task to a degree not found in other subject matter fields, even in mathematics. If a textbook, for example, is not to be outdated by the time it is published, how can the author and publisher decide with any degree of assurance when a "safety period" has been reached or how long it will last? The tremendous cost of publishing such texts and the risk of new discoveries, particularly in physics and chemistry, do much to explain the outmoded courses most high schools offer in those two subjects. Although general science and biology always have larger potential registrations in grades 9 and 10 than chemistry and physics in grades 11 and 12, this does not explain the actual decline of enrollments in physics and chemistry between 1934 and 1949 as against increase of enrollments in general science and biology.[17] The explanation, in part, is very simple: lack of modernized texts and teaching methods. Although enrollments in chemistry increased in 1954-55 and again in 1956-57, only in the latter year was the increase in number matched by an increase in percentage—for the first time since 1909-10! Enrollments in physics increased in both of those years, but national percentages continued to decrease. Its percentage based on grade 12 showed a slight increase in 1956-57.[18]

In our concern for mathematics and science, important as they are for our national security, we must not overlook the importance of foreign languages. They too play a vital role in national defense. All nations try to keep abreast of current developments throughout the world as they are reflected in the social, political, economic, military, and scientific activities within and without each country. The compilation, organization, translation, interpretation, and correlation of masses of highly complex and technical material cannot be entrusted to amateurs. These various tasks must be performed by and under the direction of linguistic experts upon whom our national leaders depend for a continuous flow of digested and annotated information. Failure to understand and consequently to translate vital material correctly could imperil the safety of the free world.

The knowledge such responsibilities require cannot be obtained except by a rigorous study. The road to mastery in this field is also long and difficult, but the need has never been greater. Even on the diplo-

matic front, where facility in languages would seem indispensable, we often offend our friends and weaken our influence by the self-protective assumption that ours is the only language worth knowing.

The State Department has an intensive language training program in its Foreign Service Institute and the Armed Services give excellent training to many officers and enlisted men. All of these activities have some elements of a "crash" program, as it is sometimes called. Despite the great need for language experts and for diffusion of linguistic knowledge, we have somehow failed to capitalize on one of our greatest opportunities. Among the thousands of armed service personnel stationed in numerous countries all over the world, what incentives and opportunities are offered in language training and instruction? With native instructors readily available, why do we leave such matters on a purely voluntary basis and not incorporate language study as part of the serviceman's training abroad? We send a handful to language schools in this country, and then fail to organize language classes in situations and places where they would be most effective.

This disregard for foreign languages is painfully evident throughout our educational system. Although encouraging progress has been made in the past few years with language instruction in elementary schools, the effect on high school foreign language study has just begun to be noticeable. In 1933-34 the equivalent of about 36% of the high school students studied one or more foreign languages. By 1954-55 *the figure had dropped to a little below 21%*. In both of those years and in the intervening period approximately 90% of all students enrolled in a foreign language studied it usually for only two years.

By way of contrast, in 1955-56 it is reported that 100% of students in classes VIII, IX, and X of Russian-speaking schools studied a foreign language: about 40%, German; 40%, English, and "remaining 20% either French, or in a few schools, Spanish or Latin." The students begin the language in class V and apparently study the same language for six years. It is interesting to note that in classes V and VI the language is studied four hours a week, and in the remaining three years three hours a week.

Mathematics, which begins with class I and continues through class X, is studied six hours a week each year. Arithmetic is the subject through class V, algebra and geometry, in classes VI through X, to which trigonometry is added in class IX and an introduction to calculus in class X."

In American high schools in 1956-57 the equivalent of 110% of

grade 9 studied general mathematics (43%) and elementary algebra (67%). About 42% of grade 10 studied plane geometry, 32% of grade 11, intermediate algebra, 15.8% of grade 12, trigonometry, and nearly 12.7% of grade 12, solid geometry.[20]

There is also a strong contrast in the two systems with the amount of science studied. The Russian student studies biology, for two periods a week in classes IV through VI, three periods in class VII, two in class VIII, and one in class IX. He begins physics with two periods a week in class VI, increases it to three in VII and VIII, to four in IX, and to 5/4 in X.[21] He starts chemistry in class VII with two periods a week, increases it to three in IX and the first semester of X, and to four in the second semester of X.

In this country in 1956-57 slightly over 67% of students in grade 9 studied general science; 74% of grade 10, biology; 34% of grade 11, chemistry; and 24.5% of grade 12, physics.[22]

The work load of a Russian student in each of the last three years of secondary school is given as 33 hours a week. During those three years, by way of summary, he spends an estimated 3,267 class hours on all subjects studied. Of these, 445.5 hours or almost 14%, are devoted to Russian language and literature; 594 hours or 18%, to mathematics; 396 or 12%, to history; 379.5 or 11.6%, to physics; 297 or 9%, to foreign languages; 280.5 or 8.6%, to chemistry; 99 hours, or 3%, to biology; 33 hours or 1%, to astronomy. The remaining hours are taken up with physical education (198 hours), technical drawing (99 hours), practical study of agriculture, machine construction, and electrotechnology (198 hours), constitution of the USSR (33 hours), and psychology (33 hours). Apparently there are no electives.

A program of this sort is obviously not geared to the average student. At the same time the attempt has been made to provide adequate teachers and to avoid oversize classes. The student-teacher ratio was 33.1 to 1 in primary-secondary schools in 1927-28; in 1955-56, it was 17 to 1. The corresponding ratio in the United States in the latter year is given as 26.9 to 1.[23]

Student-teacher ratios, derived by dividing the number of students by the number of teachers, obviously give an average. Although information of this sort may be useful, it may also be deceptively comforting, because it may conceal situations in which the average is far from representative. Much more significant would be data about the number of students in language, in mathematics, and in science classes, or in any class where size affects, not the quality of teaching, but its effectiveness. The organization and presentation of material reveal

quality or the lack of it in varying degrees. But teaching, though good in quality, may be frustratingly ineffective when class size prevents individual attention and response. Age and maturity are factors to be considered also, but the type of subject matter is usually a better guide in determining proper class size.

During a period of general teacher shortage, however, the problem of class size is usually pushed to the background by one more insistent and immediate—the mad scramble for teachers. Unless conditions change radically, the scramble now going on will continue, and the teaching fields most seriously affected in high school—and in college—will continue to be the very subjects which are irreplaceable in the education of scientists and engineers. To make the vicious circle complete, the mad scramble for engineers, scientists, and technologists, in government, in business and industry, and in the armed services has enticed many prospective and actual teachers away from the very positions in high school and college that are indispensable for training the very experts industry and government so badly need.[4]

There is little doubt that poor salaries in teaching are one of the basic reasons for teacher migration in the United States and a strong factor in keeping many away for whom teaching would otherwise have a powerful appeal. Under such conditions two things are absolutely imperative: increasing of salaries and making the best possible use of those actually engaged in teaching.

What is the "best possible use"? The answer is so obvious that it seems absurd to state it. In a period of increasing shortage of teachers, a shortage which is not uniform in all states or in all subjects, many teachers tend to be compelled to teach subjects for which they are not fully qualified. Although this cannot always be avoided, its prevalence is undoubtedly a factor in causing some teachers to seek other kinds of employment. For there is one thing certain: having him teach the subject he is best prepared to teach, is the best possible use of a teacher. It makes for the kind of morale that enables a teacher to do his best and makes him want to keep on teaching. Besides that, it is just plain common sense.

True, the human and practical elements involved make this a complicated problem. Fortunately two reports are available that will reveal more clearly its nature and possibly suggest some solutions. A special table in each of these makes it possible to compare the number of new teachers employed in each of the two years in the public high schools of the states listed, and the teaching assignments by major and minor subject-matter fields.[5]

Since there are 19 different fields listed by name, the possible major and minor combinations are somewhat numerous. Only a comparatively few can be mentioned.

In English, for example, in 1954-55 there were 3,668 new teachers. Of these only 2,091 taught English and nothing else. The remaining 1,577, or 43%, taught an additional subject in one of the other 18 named fields. Most of them were in social science, foreign languages, speech, library science, physical education (girls), mathematics, journalism, general science, and commerce. In the order named these teachers ranged in number from 551 to 49. Only one was assigned to physics, two to chemistry, and four to biology. Not counting the 12 in agriculture, the 23 in art, and the 25 in home economics, English teachers are a versatile lot!

But there is another side to the story. In the same year, 1954-55, there were 927 other new teachers to whom English was assigned as a second subject. The largest number, as might be expected, came from those qualified in social science as a major subject—254, or 27%. The next largest, as might also be expected, came from foreign languages—11%, and then commerce and music, with 10% each.

If all those teaching English are considered (3,668 plus 927), approximately 45% taught it exclusively and 20% as a second subject. In 1955-56 these percentages were about 49 and 16 respectively.

It might be supposed that in subjects considered somewhat more highly specialized than English—mathematics, foreign languages, and science—a different situation might hold. The difference is mainly in degree.

In 1954-55 there were 191 new teachers of physics. Of these 122 taught physics exclusively. The remaining 69 taught in 11 other fields, but 45 out of the 69 taught related subjects, chemistry (17), general science and mathematics (14 each). Of all those teaching physics, however, only 35% taught it exclusively and 44% taught it as a second subject. In 1955-56 comparable figures were 28% and 54%.

Chemistry fared somewhat better. Of all teaching the subject in 1954-55, 33% taught it exclusively and 33% as a second subject. In 1955-56 comparable figures were 30% and 38%. Biology changed from 31% and 44% to 23% and 45%; general science, from 35% and 39% to 35% and 37%; mathematics, from 44% and 25% to 45% and 26%; foreign languages, from 31% and 41% to 36% and 40%; social studies, from 43% and 35% to 41% and 37%.

During the two-year period there were some developments which

the figures cited above perhaps do nnt entirely make clear. The total number teaching each of these eight subjects increased, in varying degrees, but the number teaching exclusively physics or chemistry or biology or mathematics decreased. This was not the case in the other four subjects. The number teaching physics or chemistry *and* a second subject also decreased. The total increase in those two fields was caused by an increase in thnse teaching each of them *as* a second subject. Those teaching biology or mathematics *and* a second subject and those teaching each of them *as* a second subject also increased. Teachers of the other fnur subjects increased in all three respects—those teaching the subject exclusively, those teaching it *and* a second subject, and those teaching it *as* a second subject. It is interesting—and disturbing—to note that in 1954-55 the number teaching physics or biology or general science or foreign languages as a second subject was larger than the number teaching any of them exelusively. This was also true for each of these subjects *and* for chemistry, in 1955-56, and in each case the number teaching each of them as a second subject increased. The number teaching each of the other subjects—English, mathematics, and social studies—as a second subject increased, but in neither year was that number as large as the number teaching each subject exclusively, which also increased.

These statistics, limited though they are in the period and geographical area covered and restricted to new teachers, indicate the type if not the extent of one of the most serious educational problems we face: the recruitment and effective use of teachers. There can be little doubt that the kind of teaching assignment a teacher gets is an important factor in keeping that teacher in the profession. It is also important for getting the best kind of teaching.

The usual high school teacher has one major subject and one or two minor subjects in which teaching competence is assumed. Often the subjects are in the same general field, such as physics and chemistry, biology and general science, or they are in combinations of kindred subjects, such as mathematics and a science, English and a foreign language, or history and English.

Although there are many factors involved, it is logical to assume that a teacher's major assignment would and should be in the field of his major preparation and competence. All teachers are not outstanding, even in their specialties, but they are likely to be at their best in those subjects. There is little doubt that teaching assignments often violate good academic practice and sound educational principles. Expediency is not exclusively a political rationalization. Who has not

And that number will grow as soon as more teachers are trained to use the texts and methods that have been developed for this linguistic awakening.[26]

But how does this relate to the high schools? In a very practical yet perhaps not so simple way.

It is a well known fact that, great as the teacher shortage is in certain fields in high school, it is even greater for elementary schools as a whole. There are many language teachers in high school—though many more are desperately needed—who are teaching other subjects besides their specialty. By wise and careful planning many of these could fill out their schedules by setting up courses of language study in the lower grades and by training teachers in those grades to give the actual language instruction. Some of the high school teachers might even teach a language class or two in the grades. Or is there some law that says they can't?

Although World War II exploded the carefully nurtured myth of our language ineptitude, we Americans have not yet overcome a deep-rooted prejudice against the study of foreign languages. At a time when our need has been greatest, it is scarcely a proof of our foresight or our so-called practicality that in recent years nearly half of our high schools have offered no foreign languages at all.[27] This has naturally been reflected in college, and it was only in 1955-56 that a slight increase of graduates with a major in foreign languages began to check the downward trend in numbers and percentage that began after 1947-48. The language program in the elementary schools has already made itself felt in high school, if reports from individual schools and teachers here and there are at all representative. The slight increase in modern language majors in college in 1955-56 may indeed be the first faint fruits of a revival of foreign languages.[28]

As indicated earlier in this chapter, such a revival in science and mathematics has definitely started. The movement began in time to be reflected in enrollments in 1956-57 and would undoubtedly have gathered momentum from the coordinated efforts of the most concentrated and sustained educational drive this country has ever experienced. At a fortuitous moment two things happened, neither connected with the other, and yet they served to illustrate effect and cause in that order: the Russians launched Sputnik I and Sputnik II, and the Department of Health, Education, and Welfare launched *Education in the USSR*. From seeing evidence of Russian pioneering achievements in science with the naked eye, the public had a chance to read and hear about the educational system that produced them.

After hotb initial shocks had passed into retrospect some of thc soher second thoughts would seem to indicate that a complete revamping of our educational system was perhaps not yet in store. That system bad its weaknesses, and the chief among thcm was the flexihility of the curriculum. And yet, perhaps it was not so much that as the kind of intellectual atmosphere produced ns the result of that flexihility under an elective system.

There is no douht ahout it, the atmosphere is not one conducive to the study of mathematics, science, and foreign languages. Is it, on the otber hand, conducive to study of English and social studies, particularly bistory? The answer here would also seem to be No.

What kind of atmosphere, then, do we find in our high scbools?

Until very recently it has been the atmospherc that hard work not only doesn't pay, it's not necessary. Why study the bard suhjects? You can get into college without tbem; if you're not going to college you don't need them anyway.

It is ironical, is it not, tbat we, self-congratulated leader of the free world, creators of what is tecbnologically tbe richest civilization in man's short bistory, originators of the idea of free public education and developers of the most extensive system of public education ever known—it is ironical, is it not, that we should take our cue in education from those wbo are tbe very antithesis of everything we believe and stand for?

It it douhly ironical because tbe Committee of Ten gave us in 1894 tbe pattern we need today. We followed it for some twenty brave years, hut only in part, for we failed to work out tbe recommended sequences in mathematics, science, and foreign languages to extend from the lower grades through high school.* We altered the pattern on hoth levels by the introduction of courses emphasizing social adjustment and civic betterment, and somehow in the main failed to accomplisb either. Then, to cap tbe climax of irony, the cold war taught us what we did not have the wit to see for ourselves, tbat the Committee of Ten was right: *education that stresses and combines mental discipline and cultural values is not only the best but in the long run the most practical.*

Could it be that tbe Russians studied tbe Committee's Report and followed its recommendations? Tbeir reported stress on science, matbematics, foreign languages, social studies, and tbeir own language and literature, throughout grades or classes I to X, corresponds almost exactly with the recommendations of the Committee of Ten. But let us give them due credit. It would scarcely have been necessary for

them to follow any pattern but that of plain common sense. That must he our pattern too.

Within the last few years the numher of high school students has passed the pre-war peak, and the number to graduate and enter college is getting larger each year. At the present rate, however, only between six and seven out of ten students who enter the ninth grade finish high school, and only about 50% of those who finish enter college. Since the mortality rate in college is high, *from 25 to 30% of our high school graduates must come the great majority of leaders in all the activities, public and private, that make up the complex diversity of American life.* From this comparatively small group must come the majority of our elementary school teachers. The potential source for high school and college teachers, for doctors, engineers, scientists, is even smaller, because preparation for these and many other professions requires from one to four years of graduate training beyond college. The kind of education a relatively small group of students is now receiving and will receive is a matter therefore of the utmost importance and concern.

But what about the large percentage (35-40) of our students who do not finish high school? What ahout the 50% of high school graduates who do not enter college, many of whom are far ahove average in ahility? What about the 50% who enter college hut fail to graduate? Is the kind of education *they* receive unimportant? Is the kind of education they receive in high school a telling factor in their undeveloped potentialities? Whatever the reasons, many and varied as they are, the accumnlated waste is a tragic loss for the individual and for the society in which he could be a vital part.

The prevention or reclamation of such waste has long given concern, and the efforts to that end are receiving increased public attention. These efforts, it is now more than ever realized, must include ways and means of developing to the full the capacities of all students and of speeding up the educational process for those who can combine speed with thoroughness.

In "the great talent hunt" now in progress,[10] it is significant to note the great stress given to "general education" in contrast with "narrow specialization." Business and industry and government are increasingly looking for highly trained specialists, but they are realizing more and more, as many universities have, that the futurc will "demand specialists who are capable of functioning as generalists."[11]

The need for specialists with "educated talents" will increase and the quality of the education they receive will depend in large measurc

on the *fusion of liberal arts and sciences.* Education of this kind cannot be postponed until college; it must begin in high school, or better still, in the lower grades.

All over the country, in awareness of the need, high schools are reinstating the out-of-favor curriculum proposed by the Committee of Ten, in which mathematics, science, foreign languages, history and English are the principal subjects. Students are admitted to this course of study on the basis of their ability and their college plans. In some schools a program of this kind, with smaller and more selected groups, is solving the problem of the "gifted child" by making it possible for him to proceed at his own pace. In recognition of the superior quality of work and greater amount of material covered, some colleges are admitting graduates of such programs into appropriate courses beyond the usual freshman level.

There is little doubt that the number of high schools offering programs of this kind will increase, and that the very emphasis given to the required subjects will cause more students to seek and prepare for admission to them.

This is not only reasonable; it is almost inevitable. And if this is true, it will bring thousands of additional students into mathematics, science, foreign languages, history, and probably English.

There have been and are many students in high school for whom the cumulative subjects have been considered too difficult. Under our system of massive education many students *have* avoided them because they *are* difficult. These are two entirely distinct but related matters. The substitution of one subject for another is not always done on the basis of ability or even of comparative interest; it is often done through expediency and the climate fostered by companionship and environment, both at home and at school. Willing self-deception and self-indulgence are not traits confined exclusively to adults. Many students pass through school without ever really testing their ability or doing what they really want to do. In most cases they find it out—often too late.

In the past we have attempted to solve the problem of the slow learner and the lower-average learner by subjects non-academic or more practical and vocational in nature. But with great advances in knowledge of psychology and improvement of educational techniques and teaching methods, it is time for us to readjust our philosophy and to rethink our educational goals.

It is true that there will always be some students unable to learn as rapidly as others. Does it necessarily follow that the educational

pattern for them should he markedly different from that of others? Metabolism rates are not the same for all, yet all must use oxygen. Should not education follow the same principle? If mathematics and science and foreign languages are increasingly important today, should knowledge of them he confined to the intellectually *elite?*

Creative leadership in these three fields is imperative. But widespread diffusion of such knowledge among all memhers of our democracy is also imperative. Why should we say to some of our students: "You need this kind of knowledge because you can learn it," but to others, "You do not need this kind of knowledge hecause with our present texts and teaching methods and large numbers of students, you cannot learn it"? What sort of education is it that does not give a student some acquaintance with the three branches of human endeavor which now more than ever before enter into every phase of human life?

The proper solution for the slow-learner is not the notion of "easier" subject-matter. Tremendous as the task will be, it lies rather in the development and use of special texts and teaching methods and in grouping according to ahility, that will give the less gifted an education that will differ in *quantity, not in kind,* from that of his more gifted fellows. This is the essence of democratic education today, the opportunity to learn, at one's own pace and ahility, the hasic principles of those subjects without which life in the modern world is inconceivable.

It is no accident that the main core of those subjccts is the same in all civilized countries: mathematics, science, foreign languages, history' and one's own native tongue. The logic and principles of mathematics, the laws of science, the lessons of history are the samc, no matter in what language they are studied and learned. Native tongues differ, but each is the gateway to its own procreation of culture, thought, and communication. Foreign languages differ, but they constitute the media for the transmission of ideas and for the cross-fertilization of cultures.

These are the suhjects around which coordinated courses of study for all students, regardless of ability, should he built, from the grades through high school. The opportunity to learn thcm is each studcnt's new cducational hill of rights. To give each student that opportunity is to acknowledge his rightful heritage, to enlarge his usefulncss as a citizen, and to perpetuate the purposes and proccsses of dcmocracy itself.

[1] Calculations are based on figures in Tables 36 and 38 in Appendix G for the period 1890 to 1922.

[2] It is not actually known *what* percentages of its graduates went to college between 1890 and 1915. It *is* known that about 30% were prepared *for* college in 1893 and in 1900, and 49% in 1910, 34% for liberal arts colleges, and 14.0% for other higher institutions. This is the first time such a distinction was made. In 1915 comparable percentages were 35.9 and 16.2 (CR 1915-16, II, pp. 454-55). In the fall of 1921 a little more than 31% of the June graduates entered college, and 14% entered other higher institutions—the first specific information of this kind published. See Tables 24, 27, 29 and comments, in Appendix D.

[3] See Table 14 in Ch. V and Table 18 in Ch. VI. Enrollments by separate courses were first given for mathematics in 1927-28 (CR 1926-28, pp. 1064-66), and for English and foreign languages in 1933-34. See Table 20 in Ch. VI.

[4] See Table 14 and comments in Ch. V.

[5] See Table 14, Ch. V, and BS 1948-50, Ch. 5, p. 6.

[6] A new method of tabulating enrollments in English made it appear that English had also decreased proportionately. For comments on this, see Ch. IV, Table 5. All the figures and percentages in this section, unless otherwise indicated, are based on Tables 1-13 in Ch. IV, which are summarized in Tables 14 and 15 of Ch. V.

[7] Undoubtedly many of the subjects were in the curriculum in 1910 but adequate statistics had not been reported. The situation in business education in 1910 is a case in point. See Ch. IV, Table 6 and comments.

[8] Since over 99% of the students were girls, the percentage means that there were more girls in home economics in 1948-49 than there were girls *and* boys in Latin during that year. See Ch. IV, Table 8.

[9] See CR 1909-10, II, Table A (p. 1139) and Table 14 in Ch. V.

[10] BS 1950-52, Ch. 5, Table A traces these percentages between 1890 and 1952. Although 1948-49 was not included, the writer estimated its percentage on the basis of those given for 1946 and 1952.

[11] For the figures in 1948-49, see Table 19 in Ch. VI; for those in 1909-10, calculations were based on the larger enrollment figures in Table 1, Ch. IV. Although it is not likely that many students enroll in two different mathematics courses at the same time, the term *equivalent* is used in recognition of that possibility. In other words, the percentages and numbers do not necessarily mean different students. It is naturally impossible to determine the number of duplicate enrollments in any subject-matter field. This consideration, whether mentioned specifically or not, applies to all figures given in this study.

[12] Enrollment figures in the 1933-34 curriculum survey were based on reports from schools enrolling 80% of all high school students (*Bulletin 1933, No. 6*, pp. 9 and 20; BS 1948-50, Ch. 5, pp. 5 and 27). In the historical summary table in the latter reference (Table 7), the smaller enrollment figures were used without an explicit monitory footnote about the matter. There was no such footnote, for that matter, in the corresponding table (Table 2) in the former reference.

[13] See Ch. VI, Table 19 for mathematics and science, Table 20 for foreign languages and English.

[14] See CR 1909-10, II, Table A (p. 1159).

[15] See Ch. IV, Tables 1-3, and Ch. V, Table 14.

[16] See Ch. VI, Note 32 and related comments in text. For a short but interesting account of the new developments, written for laymen, see "The Wonderful World of

Why," in *Saturday Review* (Nov. 2, 1957), pp. 42-45, by Helen Rowan.* In the same issue (p. 45) John Lear writes of the Commission on Mathematics set up in 1955 by the College Entrance Examination Board with a grant from the Carnegie Foundation. Its function is to explore ways and means of speeding up changes in the mathematics curriculum in high school. Mentioned also is the Carnegie grant to Dr. John Mayor of the University of Maryland to "modernize the arithmetic now taught in junior high school." The *Committee of Ten* (Table I and pertinent comments) suggested a course of study in grades 1 through 8 in which, in addition to arithmetic, "Algebraic expressions and symbols and simple equations" were to be introduced. From the fifth through the eighth grades one period a week was to be given to "concrete geometry." In the *Report* of the Committee of Fifteen (pp. 93-95) algebra was assigned five periods a week in grades 7 and 8 in place of arithmetic. Geometry was not included.

* Miss Rowan's account was apparently adapted from a longer article in the Carnegie Corporation of New York *Quarterly* (October 1957) of which she is editor.

[17] See Ch. VI, Table 19, and comments earlier in this chapter. For need of new texts and teaching methods, see "Starving Our Potential Scientists" by Kenneth E. Brown, reprinted from the 1955 November-December issue *Armed Forces Chemical Journal*; *Quarterly Report* of the Carnegie Corporation of New York, January, 1955, and various reports of the National Science Foundation. For a short account of a research program conducted at Teachers College, Columbia University, to improve "current high school and chemistry courses," see *New York Times* (Nov. 17, 1957), p. 49. See also the excellent summary: "U.S. Science, Where It Stands Today," in *Time* (Nov. 18, 1957), and Dr. Benjamin Fine's alarming report about science teachers in *The New York Times* (Nov. 24, 1957).

[18] See previous Note and Table 18. See also Tables 2, 3, and 5 of Pamphlet No. 118, and Tables 3, 4, and 7 of Pamphlet No. 120.

[19] *Education in the USSR*, p. 74 and Tables 6, 7, 8 for foreign languages. These tables also contain data on all other subjects mentioned in this section. The curriculum is discussed in pp. 67 to 83. Unless otherwise indicated all information was taken from these sources. *Korol* (see Appendix A) presents material on Russian education in a different way, but it corroborates the figures and percentages given in this chapter. Tables 9, 11 and 13 of his chapter 2 correspond to above Tables, 6, 7, 8.

[20] *Pamphlet No. 120, 1957*, Table 17. *Pamphlet No. 118*, 1956, Tables 3 and 12, was apparently the source for the statement in *Education in the USSR*, p. 67, that in June 1955 "less than a third of the American high school graduates had taken a year of chemistry, about a fourth had a year of physics, and less than a seventh had taken advanced mathematics." The statement about mathematics is probably inaccurate. See Table 19, Note 4.

[21] The use of "5/4" indicates five periods in the first semester, four in the second.

[22] *Pamphlet No. 120*, 1957, Table 7. Apparently the Russians have nothing that corresponds to general science. Apparently too they have decided that physics should be studied before chemistry. This was probably the order in our high schools until about 1910. See Ch. VI, Table 18, and pertinent comments.

[23] *Education in the USSR*, p. 86 and Footnote 10. It is assumed that these ratios are based on statistics that include *shifts*. If the data given are now applicable, grades I-IV are in school from 8 a.m. to 12 or 1 p.m.; grades VII and X, for an hour longer, 1 or 2 p.m.; and grades V, VI, VIII, and IX, generally to 7 or 8 p.m. In 1929-30 the student-teacher ratio in secondary day schools in this country was 24.4; in 1951-52 it was 23.2 (BS 1950-52, Ch. 5, Table A).

[24] The report entitled *Teacher Supply and Demand in Colleges and Universities* (November 1957) makes this very plain on the college level. It also has many facts and figures about the situation in high school.

[25] The data for 1954-55 are found in Table 4 of "A Brief Summary of the 1955 Teacher Supply and Demand Report," and those for 1955-56, from Table 8 of "The Postwar Struggle to Provide Competent Teachers." There were 29 states common to both tables, two in the first year that did not appear in the second, and five in the second that did not appear in the first. Of the 29 common to both, 15 were located in the Middlewest and Far West; 6 in the Middle Atlantic States and New England; the remaining 8 in the South and Southwest. In both tables the word "new" refers to teachers who were not teaching in the year immediately preceding the fall of 1954 and of 1955 respectively.

[26] See Note 33 and pertinent comments in Ch. VI.

[27] PMLA, pp. 52-56. This special study (see Appendix A) indicated that 56% of the high schools offered foreign languages, and 48.6%, modern foreign languages. In 1933-34, the last time such data were given, 63% offered Latin, 85% offered French, and 17%, Spanish. The percentages were calculated by the writer from data in *Bulletin 1933, No. 6*, Table 3. It could not be determined what percentage offered modern languages alone or in combination with Latin. For additional information, see "Latin in the Public Secondary Schools," by S. D. Atkins, J. L. Heller, and P. L. MacKendrick, in *The Classical Journal* 51 No. 6-8 (March, April, May 1956), 269-78; 309-12; 365-7.

[28] See pertinent comments and Table 21 of Ch. VI, for situation between 1947-48 and 1954-55. For changes in 1955-56, see *Earned Degrees*, Tables 4, 6 and 7. The last table (No. 7) shows that majors in all languages constituted 1.27% of all first-degree graduates. French was in the lead with 0.45%, Spanish next, with 0.43%, classical languages, 0.16%, and German, 0.12%. As Table 21 shows, the gains over 1953-54 were slight; Latin actually had a slight decrease. For a short but challenging article on the educational and national importance of language study for this country, see "Foreign Languages in American Education," by Ernest M. Wolf, in *Journal of Higher Education* 27, No. 9 (December 1956), 485-88, 513.

[29] Foreign languages were discussed briefly in the text above. For mathematics, see second half of Note 16. As a science sequence in the lower grades the Committee recommended that natural phenomena be studied five periods a week and botany and zoology for at least two periods a week in grades 1-8. Study of the latter in particular should be associated with literature, language, and drawing. The Committee realized that elementary teachers would be unprepared to guide their pupils in observation of natural phenomena and recommended that special science teachers or superintendents be appointed to instruct the teachers. See Committee's *Report*, pp. 25-28, 34-35. The Committee of Fifteen (pp. 75-95 of its *Report*) agreed in principle with the Committee of Ten, but recommended that the amount of time be reduced to two hours a week.

[30] This telling phrase is used as the title of the introduction to the *Annual Report* of the Carnegie Corporation for 1956, by its president, John W. Gardner, and commented on editorially by the *New York Times* (January 27, 1957).

[31] Gardner, *op. cit.*, pp. 22-23.

APPENDIX A

BIBLIOGRAPHY

Publications of the United States Office of Education are the primary sources of information for this study. To avoid space-filling repetitions in the list of these publications, the various titles and governmental affiliations of the Office of Education, with dates, are given below:

1867 Department of Education, an independent agency.
1869 Office of Education, under the Department of the Interior.
1870 Bureau of Education, under the Department of the Interior.
1929 Office of Education, under the Department of the Interior.
1939 Office of Education, under the Federal Security Agency.
1953 Office of Education, under the Department of Health, Education, and Welfare.

Primary Sources

Footnote references to the primary sources occur so frequently in the text that a simple form of abbreviation, as shown below, was adopted. Each abbreviation is followed by a date indicating the period or year covered by the report. In most cases the period is that of an academic rather than a calendar year. Most dates, accordingly, are in the form 1889-90, etc.

I. BOUND VOLUMES

CR: Report of the Commissioner of Education. (These reports appeared annually between 1867 and 1916. Volume I or II is given, as appropriate.)

BS: Biennial Survey of Education. (The first of these appeared for the biennium 1916-18. Ordinarily these were issued as separate chapters, with different dates of publication. References to the surveys covering each biennium between 1916-18 through 1932-34 are to the bound volumes I or II, as appropriate, with the single exception noted below.)

II. SEPARATE CHAPTERS, REPORTS, OR STUDIES

Bulletin 1938, No. 6: "Offerings and Enrollments in High-School Subjects 1933-34." (A part of the survey of 1932-34, but not printed in the bound volume.)

Bulletin 1940, No. 2, Ch. 1: "Statistical Summary of Education, 1937-38."

BS 1948-50, Ch. 5: "Offerings and Enrollments in High-School Subjects 1948-49." (Published in 1951.)

BS 1948-50, Ch. 1: "Statistical Summary of Education, 1949-50. (Published in 1953.)

Bulletin 1950, No. 9: "The Teaching of Science in Public High Schools, 1947-48." By Philip G. Johnson.

BS 1950-52, Ch. 5: "Statistics of Public Secondary Day Schools 1951-52." (Published in 1954.)

BS 1950-52, Ch. 1: "Statistical Summary of Education, 1951-52." (Published in 1955.)

Bulletin 1953, No. 5: "Mathematics in Public High Schools." By Kenneth E. Brown. This study covers the year 1951-52 and the first semester of 1952-53.

Circular No. 269: "Why Do Boys and Girls Drop Out of School, and What Can We Do About It?" Report of a Work Conference on Life Adjustment Education, held in Chicago, January 24-27, 1950. (Reprint 1953.)

Earned Degrees: "Earned Degrees Conferred by Higher Educational Institutions." The first of these reports covered the year 1947-48, the last, 1955-56. The title of each includes the specific year.

Pamphlet No. 118, 1956: "Offerings and Enrollments in Science and Mathematics in Public High Schools." By Kenneth E. Brown. Brown.

Pamphlet No. 120, 1957: "Offerings and Enrollments in Science and Mathematics in Public High Schools, 1956." By Kenneth E. Brown.

School Life (Feb. 1953): "High School Retention: How Does Your State Rate?" By Walter H. Gaumnitz. *School Life*, 35, No. 5, pp. 69-71 (Feb. 1953).

School Life (May 1955): "Elementary and Secondary School Enrollment in the Public School System of the United States, By Grade, 1949-50 Through 1959-60." By Emory M. Foster and Carol Joy Hobson. *School Life*, 37, No. 8 (May 1955).

School Life (May 1956): "Public School Enrollment By Grade—1953-54." *School Life*, 38, No. 8 (May 1956).

School Life (June 1956): "High School Enrollments in Science and Mathematics . . . some facts and figures." *School Life,* 38, No. 9 (June 1956).

BS 1952-54, Ch. 4, Sec. 1: "Statistics of Higher Education: Faculty, Students, and Degrees, 1953-54." (1956.)

BS 1952-54, Ch. 1: "Statistical Summary of Education, 1953-54." (1957)

BS 1952-54, Ch. 2: "Statistics of State School Systems, 1953-54." (1956).

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Committee of Fifteen: Report of the Committee of Fifteen on Elementary Education. With the Reports of the Sub-Committees: On the Training of Teachers; On the Correlation of Studies in Elementary Education; On the Organization of City School Systems. Published for the National Educational Association by the American Book Company (New York, 1895).

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Johnson, Clifton: *Old Time Schools and School Books.* The Macmillan Co. (New York, 1925).

Kandel, I. L.: *History of Secondary Education.* Houghton Mifflin Co. (Boston, 1930).

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Maul, Ray C.: "A Brief Summary of the 1955 Teacher Supply and Demand Report." Reprinted from *The Journal of Teacher Education* (March 1955). Prepared by the NEA Research Division under the supervision of Ray C. Maul.

Meriwether, Colyer: *Our Colonial Curriculum 1607-1776.* Capital Publishing Co. (Wasbington, 1907).

PMLA "Foreign Language Offerings and Enrollments in Public Higb Schools 1954-55." Publications of *The Modern Language Association*, 70 (No. 4, Pt. 2, September 1955), 52-56.

Russell-Judd: The American Educational System. By Jobn Dale Russell and Charles H. Judd. Hougbton Mifflin Co. (Boston, 1940).

Teachers for Tomorrow: Published by The Fund for Tbe Advancement of Education as Bulletin No. 2 (November 1955).

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APPENDIX B

A CHRONOLOGICAL LIST OF REFERENCES MOST FREQUENTLY USED

To save time and space a list of the most frequently used references is given below, with appropriate entries as to year, volume, chapter, tables, and pages.

B: Bulletin
BS: Biennial Survey of Education
CH: Chapter
CR: Commissioner's Report
G: Graduates
GE: Grade enrollment
HT: Historical Table
SE: Subject enrollments
TE: Total high school enrollment
T: Table

Roman numerals always refer to *volumes*. Entries unnecessary are omitted.

Year	*CR* or *BS*	*T E*	*G E*	*S E*	*G*	*H T*
1889-90	Same	II,1388		II,1388-92	II,1389	II,1392
1899-1900	Same	II,2129		II,2129-39	II,2139	II,2123
1909-10[1]	Same	II,1130	II,1130	II,1174-84	II,1143	II,1139
1914-15	1915-16	II,448	II,448	II,490-503	II,454	II,487
1921-22[1]	1920-22	II,534	II,535	II,580-601	II,539	II,578-79
1026-27	1926-28	p. 976	p.976	pp.1058-87	p.1042	pp.1057-58
1933-34[1]	1932-34	Ch.5,T.1	B.1938,No.6, p.9,Note 1	B.1938, No.6,Ts2-4	Ch.5,p.57	B.1938, No.6, T.1
1048-49	1948-50	Ch.5,T.7	Ch.5,p.6, Note 5	Ch.5,T.3	BS1952-50 Ch.4,Sect.1, T.XXIV	Ch.5, T.7

[1] For the special situation in these years, see Appendix C, Notes 2-4, respectively.

APPENDIX C

CUMULATIVE AND OTHER SUBJECT ENROLLMENTS BY SEX

For many years high school education was no respecter of sex. Since girls have outnumbered boys in high school, at least since 1899, it is of some historical interest and educational importance to see what effects this fact has had on enrollments by sex in an expanding curriculum.

Although all subjects could not be included in the tables below, the list is fairly complete through 1910, and reference is made to most of the others brought in after that date. The resulting picture has two serious drawbacks; the data are based on actual enrollments for each sex, only through 1928, except in science and mathematics. These are carried through 1955; the other subjects, through 1949. Between 1934 and 1949, inclusive, total enrollments in these other subjects are known from official records, but not proportionate enrollments by sex. For lack of other evidence proportions corresponding to those of 1928 are assumed for 1934 and 1949.

In 1890, as Table 22 shows, Greek was the only one of nine subjects listed in which girls did not outnumber boys, and in every instance, by a considerable margin. In all of the subjects except Greek and geometry their numbers were proportionately greater than their numerical superiority in the entire enrollment. In 1909 the preponderance of girls except in Greek and trigonometry was again striking. The proportion of girls in high school, however, had increased slightly and was proportionately greater than their numerical superiority in 9 of the 16 (out of 18) subjects in which they led the boys. In 1910 they led the boys in 19 out of 24 subjects, and in 11 of the 19 their numerical superiority was proportionately greater than their percentage of high school enrollment, which had decreased slightly in the intervening decade. Among the sciences chemistry was the first to leave the distaff column, but physics was tottering on the brink of male dominance and by 1922 had been decidedly masculinated. In that year, the first of national woman's suffrage, although the girls held the lead in 5 out of 10 subjects in science, the number of boys in the whole field

TABLE 22[1]

PERCENTAGE OF GIRLS IN CERTAIN SUBJECTS IN THE LAST FOUR YEARS OF PUBLIC HIGH SCHOOLS IN CERTAIN YEARS BETWEEN 1889-90 AND 1954-55

	1890[2]	1900	1910[3]	1922[4]	1928[5]	1948[6]	1955[7]
Enrollment in 1000's	203	519	739	2155	2897	5653	6584
Percent of Girls	57.6	58.4	56.2	53.6	51.9	51.4	51.0
Physics	58.4	57.4	50.6	41.4	34.4	28.0	20.0
Chemistry	58.9	55.8	43.4	42.8	42.0	44.3	43.1
Biology			60.8	53.0	53.4	53.2	50.9
General Science				49.1	49.3	52.4	
Physiology		57.5	56.6	55.6	56.5		
Phys. Geography		57.9	54.1	52.8	51.5		
Geology		59.3	53.9	49.5	43.2		
Zoology			57.7	49.9	45.5		
Astronomy		62.2	57.8	52.2	48.4		
Botany			57.9	56.0	56.1		
Algebra	58.0	57.8	54.0	48.6	47.3	45.7	45.3
Geometry	57.2	58.9	53.8	48.0	45.6	40.7	38.7
Trigonometry		47.0	27.9	24.9	22.9	19.8	21.5
General Math.				56.4	50.4	48.5	47.3
Latin	59.1	61.2	59.3	56.3	58.0		
Greek	33.8	46.3	44.1	36.5	38.7		
French	65.6	64.9	62.9	58.6	56.7		
German	59.2	61.1	57.0	41.2	43.4		
Spanish			49.5	51.2	51.1		
History	58.9	60.6	56.9				
Amer. History				55.3	53.2		
Ancient History				53.2	51.3		
Med. & Mdd. History				52.8	50.9		
Civil Government			55.6[8]		53.1		
Civics		57.5[8]		54.5[8]	51.7		
Rhetoric		59.5	56.1				
English Literature		61.6	66.4				
English				54.2	52.2		
Bus. & Comm. Courses		51.6	56.8				
Bookkeeping				62.7	61.1		
Shorthand				76.5	80.9		
Typing				69.9	70.9		
Home Economics			94.4	99.1	99.1		
Manual Training			36.8	4.7	1.4		

[1]Percentages not given in 1910 or before indicate that the subjects were not listed by the Office of Education in those years. Those not given after 1928 indicate that the subject had

jects listed in the table for 1922 and 1928, the girls also held strong leads in all other subjects listed in the field. The striking contrast between enrollments in home economics and manual training has almost certainly been maintained in the former. With the enlargement of the manual training field to include nonvocational subjects, the disparity between the two sexes has probably become less, but boys are doubtless still in the lead.

When drawing was first listed in 1914-15 girls slightly outnumbered boys. By 1922, however, boys were ahead by a sizeable margin. In 1928, when art and drawing were combined, girls were far in the lead. During this same period there were far more girls than boys in all branches of music instruction, except in instrumental music in 1928.

Up until 1922 the only form of physical training reported statistically was military drill, in which only boys took part in relatively small numbers. In that year boys slightly outnumbered girls in physical training, which was listed for the first time. In 1928 considerably more girls than boys were enrolled in physical education, but with the help of military drill the boys maintained their lead.

As shown in the table, after 1928 the Office of Education discontinued the breakdown of enrollments by sex. Since that date a few special studies included such information for science and mathematics, or provided data from which it could be obtained. In these special studies the percentage patterns for girls after 1928, in every case except in chemistry and trigonometry, seem to bear out the trend indicated before 1928. There is no reason to think that the same thing would not be true in the other subjects.

One bit of evidence that points in that direction is the commonly accepted assumption that certain subjects are more suitable for one sex than for the other—mathematics and science for boys, almost all others for girls. Before 1910 such an assumption would have been difficult to document; by 1928 it might seem to have had reasonable validity. This in itself may have had an unconscious psychological influence on the girls or their parents and advisers, in the selection of some subjects instead of others.

A few examples will show, however, that division of subject enrollments by sex is relatively meaningless and might even be misleading. In 1890 boys constituted 66% of the students in Greek and 41% of the students in Latin. The two figures give not the slightest indication that boys in Latin outnumbered those in Greek 10 to 1, or that total enrollments in Greek were 3.1% of the high school enrollment and those in Latin, 34.7%. In 1955 boys were 55% of the total in

algebra, and 80% of the total in physics. The two figures could give no clue to the actual enrollments of boys in each subject—242,000 in physics, over 900,000 in algebra.

In recent years, when the shortage of scientists and engineers has become a problem of major proportions, it is certainly necessary to know how many boys—the main source of supply—are studying mathematics and science in high school. But to relate their number to the number of girls does not get at the heart of the problem, which is simply this: What proportion of each sex is enrolled in the basic subjects? This will show not only the actual source but what is equally important, how it compares with the potential source.

Information of this sort involves more than our national security. When it is compared with similar statistics for other subjects, it also reveals the kind of education our boys and girls—for they should be included—are receiving in high school.

It is not to be expected that all who study science and mathematics and foreign languages in high school will specialize in those or related fields in college. This has not been so in the past; it will not be so in the future. Hence no attempt is made in Table 23 to relate the proportion of boys and the proportion of girls in various subjects to their post high school plans. The table traces in chronological sequence, within the limits of available data, the changing pattern of high school studies, as reflected in the proportionate subject enrollments of each sex.

The percentages in this table follow the pattern of those in Table 1 (Mathematics), Table 2 (Foreign Languages), and Table 3 (Science), of Chapter IV. Among the individual science subjects, physics had its largest proportion of enrollments of each sex in 1890. In 1894-95 four new science subjects were listed, and in 1895-96 the number of boys enrolled in the six subjects (chemistry included) was equal to 98.3% of all boys enrolled in high school; the number of girls, to 07.3% of all girls in high school.[1] The proportion of each sex enrolled in each of these subjects, except chemistry, decreased in 1910 and each year thereafter. Between 1909 and 1922 the proportion of boys in chemistry increased slightly. After a slight setback in 1928, the proportion reached its all-time high in 1948. The proportion of girls increased slightly between 1910 and 1922, had a setback in 1928, and a good recovery in 1948. It was still, however, below its high points of 1899 and 1909.

Of the three new subjects listed in 1910 only biology increased in the proportion of students enrolled in each sex. The proportion of boys

Bus.& Comm. Course	15.3	11.8	10.9	11.1								
Bookkeeping					10.1	14.7	8.2	12.9	7.6	12.0	6.7	10.5
Shorthand					4.5	12.7	3.5	13.5	3.6	13.9	3.1	12.2
Typing					8.5	17.0	9.2	20.6	10.1	22.6	19.6	30.4
TOTAL	15.3	11.8	10.9	11.1	23.1	44.4	20.9	47.0	21.3	48.5	29.4	53.1
Home Economics			0.5	6.3	0.2	26.4	0.3	29.8	0.3	30.1	0.4	43.6
Manual Training			5.2	2.4	21.4	1.0	15.2	0.2	24.7	0.3	31.3	0.4

[1]For references, except as indicated below, and pertinent comments, see Notes 1-8 to Table 22. The enrollment by sex is given in thousands. In 1910, 1922, and in 1928 the sums of enrollments by sex are 1,000 less than the total enrollments given in Table 22. This was caused from rounding off the figures to the nearest thousand. The total percentages, as in the tables of Chapter IV, indicate that all enrollments in the various courses of a subject-matter field equal that percentage of the total high school enrollment. Students taking more than one subject in a given field could not be eliminated.

[2] See Note 2 of Table 22 above. If the distribution of the "extra" students, made in the second reference, had been followed, boys would have numbered 88,000; girls, 117,000. Since the distribution did not extend to subject enrollments, the additional students were not included in the total enrollments by sex. The subject percentages for each sex, therefore, should be slightly lower.

[3] The percentages for science subjects were calculated by the writer from data in *Bulletin 1930, No. 9*, Tables 7 and 8 (note 6 of Table 22 above). The percentages in all other subjects in this column are for the year 1933-34 and were calculated by the writer with a proportion set up for each subject as follows: subject-percentage for boys *is to* the total subject-percentage of that year *as* X *is to* the total subject-percentage of the next year in sequence. The solution for *X* gives the subject-percentage for boys in the latter year. One example will illustrate. In 1927-28 the percentage of all high school students enrolled in algebra was 35.2. In 1933-34 it was 30.4. The following proportion then was set up: 38.7:35.2 *as* X:30.4. Solution for *X* gave 33.4 as the percentage of all boys enrolled in algebra in 1933-34. A similar proportion was set up for girls.

The use of this method meant of course that the *relationship* between the percentages for girls and boys would be the same in each of the two years. After an interval of one or two years, this would not have been strange; after an interval of six years it would have been a rare occurrence. Since subject-enrollments were not broken down by sex after 1927-28, except in special studies, the method used was the only one possible. The percentages for 1933-34 are at best, therefore, only approximate, but they do fit into the general pattern.

A comparison of the percentages based on actual enrollments and those calculated by the method of proportion, may be illustrated by another example from algebra. The percentages in the table for 1922 and 1928 are based on actual enrollments. By calculation the percentage of boys in 1928 was 38.9 as compared with 38.7; of girls, 31.8 as compared with 32.0. A similar calculation for physics in the same years gave 8.6 for boys in 1928 as compared with 9.4, and 5.3 for girls as compared with 4.5.

These comparisons show that between 1922 and 1928 enrollments in algebra decreased proportionately a little more for boys than for girls; in physics, slightly less for boys than for girls. From these and other comparisons, not given here, it seems reasonably safe to conclude that the calculated percentages for 1933-34 are less than 0.5% in error for mathematics, foreign languages, and social studies.

[4] See Note 7 of Table 22 above for mathematics and science. By applying the percentages for girls in Table 22, and for boys as derived from it, to the estimated actual enrollments given in *School Life* (June 1936), p. 6, the writer calculated the percentage of each sex enrolled in the various subjects in science and mathematics, except general science. Enrollments in foreign languages were taken from PMLA, pp. 52-58. It was assumed that the estimated percentage (51.0) of girls in high school was correct. The percentages in all other subjects were for the year 1948-49, the last year in which enrollment figures were available, and were calculated by the method described in Note 3 of this table.

[5] Since no data were collected for general science in the special study, the procedure mentioned in Note 3 could not be followed. The writer estimated the percentages on the basis of trends shown in this table and in Table 22.

in general science, first listed in 1922, after a decrease between that year and 1928, began a slow recovery which lasted through 1955. The proportion of girls, except for a slight setback in 1928, showed a gradual increase.[a]

The addition of four subjects in 1894-95, mentioned above, brought about the tremendous increase in the proportion of student concentration in science subjects, that year and the year following. The proportions for each sex declined considerably in 1900. By 1910 the proportion of boys had increased slightly over that of 1900, but that of girls had continued to decrease. This was the heginning of a steadily widening gap between the proportions of the two sexes, through 1922. After that year the difference remained remarkahly constant. Throughout the entire period the proportion of girls compared very favorahly with that of boys in most suhjects, was larger in some, and this explains the larger number of girls in many of these subjects, as shown in Tahle 22. The great change in the proportion of each sex studying science came between 1910 and 1922. It may be pure coincidence that this was the period during which general science was introduced.

Although the overall developments in mathematics paralleled to a great extent those in science, there are several interesting contrasts. One of these was touched on ahove. The percentage peak for science, in both sexes, came in 1896; in mathematics it came in 1910. The period of real percentage decline in both subject fields, however, came after 1910. Except in 1890 and 1955, the number of different suhjects in mathematics was always fewer than the numher in science, if the two levels of algehra and the two geometries are counted as separate subjects. Despite this difference in numbers, the proportion of students of each sex, except of girls in 1955, was always greater in mathematics than in seience. With a few exceptions—fewer in mathematics than in science—the proportion of hoys was always greater than that of girls. In 1890, if trigonometry, which was in the currieulum, had heen listed, hoys would have exceeded girls in total percentage. As it was, the slightly larger proportion of girls in algebra overhalanced the slightly larger proportion of hoys in geometry.

The continuity of suhject-matter in mathematies nlso offers a contrast with scienee, in which study of n particular science is often determined hy grade-level of the student. Although there are many variahle faetors, such as alternation of courses in smaller schools and different requirements, a comparison of the percentages in algebra and geometry shows some interesting phenomena. Between 1890 and 1910 the differences hetween the two percentages range from 23.6 to

30.0 to 27.1 for boys, and from 24.7 to 28.1 to 25.9 for girls. Between 1922 and 1928, they decrease from 19.1 to 16.3 for boys, and from 16.1 to 14.6 for girls. In 1955 the difference for boys was 12.3; for girls, 12.7. Except in 1899 and 1955 the differences in the corresponding years were slightly greater for boys than for girls. In all cases except two the differences in matching figures were greatest when the two figures were largest, and there were gradations in difference as the two figures became larger or smaller. These relationships undoubtedly indicate that increases or decreases in geometry, since comparable percentages represent comparable figures in each sex, are directly connected with increases or decreases in algebra. These figures also show that in the same year the difference between the percentages of algebra and geometry for boys is very close to the comparable difference for girls. This relationship also shows up in a comparison of percentages in elementary and intermediate algebra, and in elementary algebra and plane geometry. In 1928, of the boys in high school 29.2% were enrolled in elementary and 9.5% in intermediate algebra. The difference was 19.7. In that same year 25.1% and 6.9% of the girls were in the respective courses. The difference was 18.2. In plane geometry 19.1% of boys were enrolled—a difference with algebra of 19.1; the difference for girls, with 15.9% in plane geometry, was 9.2. In 1955 the percentage of boys in elementary and intermediate algebra was 19.6 and 8.2 respectively—a difference of 11.4; in plane geometry, 12.4—a difference of 7.2. For girls the comparable percentages were 17.1, 5.9, and 8.1; comparable differences, 12.1 and 9.0.*

No such relationships as these could be found among any of the sciences.

After 1928, as pointed out above, it was impossible to determine the percentage of subject-enrollments by sex on the basis of actual enrollments in any of the subject-matter fields except mathematics and science. The assumption that the proportions of 1928 in the other fields were maintained in 1934 and 1949 leaves much to be desired, but no other approach was possible. It is believed, without any demonstrable proof, that any errors resulting from this assumption would have been slight in 1934. During the much longer period between 1934 and 1949, however, there were many influences at work. These undoubtedly made the situation in 1949 somewhat different from the one given in Table 23, on which the analysis concerned with 1934 and 1949 is unavoidably based.

The developments in foreign languages show some interesting similarities and contrasts with those in social studies. Although the pro-

portion of girls was always slightly higher than that of boys in both fields, the differences within each field were never great, except in 1910 in foreign languages. Between 1890 and 1910 enrollments of each sex in foreign languages were considerably greater than those in social studies. The reversal of this relationship after 1910 was caused by the addition of many social studies and the simultaneous decline in the proportion of language enrollments. By 1934 boys in all social studies outnumbered those in foreign languages a little over two to one; girls, almost two to one. In 1949 the ratio was over four to one for boys, and almost exactly four to one for girls.

It is not intended to imply that the changes in foreign language enrollments were caused primarily by increased emphasis on social studies. Undoubtedly that was a factor. Another, and perhaps greater factor, was the growing interest in business and commercial subjects, home economics, and industrial or vocational training. The effects were much more pronounced on girls than on boys.

In 1922 the number of girls in foreign languages was greater than those in all business subjects, for the last time. In 1928 the ratio of girls in the latter was almost one and a half to one; in 1934, almost two to one, and in 1949, over three to one. In 1949 the ratio in home economics was a little over two to one. In this same year girls in home economics, for the first time, almost equalled the number in mathematics and in science.

The proportion of boys in all business subjects was greater than that of girls in 1900. Since that time it has been slightly more than half that of girls in each of the years listed. In 1934 the number of boys in business subjects was slightly larger than the number in foreign languages, and in 1949, over twice as large. The same thing was probably true in vocational and non-vocational subjects.

[1] The writer calculated the percentages from data in CR 1895-96, II, pp. 1566-71.

[2] These statements about developments in general science assume, whether rightly or wrongly, that the estimated percentages for 1955 are approximately correct. See Note 5 of Table 23.

[3] The computations for 1928 were based on data in CR 1926-28, II, pp. 1062 and 1065; for 1955, in *Pamphlet No. 118, 1956*, Table 14, and *School Life* (June 1956), p. 6.

APPENDIX D

HIGH SCHOOL STUDENTS AND COLLEGE

Information about high school students and their preparation for or entrance into college has varied considerably in the publications of the Office of Education. The first statistics appeared in the Commissioner's Report for 1886-87. They included the number of boys and of girls preparing for a classical course in college, the number preparing for a scientific course in college or in a scientific school, and the "total number of 1886-87 who have entered college or scientific school."[1] Presumably these last were graduates in the spring of 1887 who entered college in the fall of that year. There was no separation of enrollments by type of college or curriculum. Since the number of graduates was not given, the percentage of graduates who entered kind were not made available until some thirty-five years later—in 1921-22.

In the meantime, however, data of two kinds were collected and published. The first of these was mentioned above: the number of all high school students preparing for one of two curricula in college, and for scientific school. These statistics appeared in each of the eighteen Annual Reports published between 1889-90 and 1909-10,[2] and in 1915-16 (for the year 1914-15). Data from five of these reports and from the one in 1886-87,[3] added for the sake of comparison, are presented in Table 24.

This table contains the three familiar characteristics previously noted in many of the tables in this study. As shown in lines 3, 6, 9, and 12, these are: increase in percentages and curriculum enrollments (1887 to 1890); decrease in percentages but increase in curriculum enrollments (1890 to 1905); decrease in percentages and in curriculum enrollments (1905 to 1910).

Since the total high school enrollments increased steadily throughout the entire period, the number of students preparing for the two curricula in college also increased through 1905, although their pro-

TABLE 24[1]

PERCENTAGE OF TOTAL HIGH SCHOOL STUDENTS BY SEX IN GRADES 9-12 PREPARING FOR ONE OF TWO CURRICULA IN COLLEGE OR SCIENTIFIC SCHOOL IN CERTAIN YEARS BETWEEN 1886-87 AND 1989-10

	1887[2]	1890[3]	1895[4]	1900[5]	1905[6]	1910[7]	LINE
Total Boys in 1000's	27	66	144	216	288	399	1
Total Girls in 1000's	42	116	206	303	391	517	2
Boys and Girls in 1000's	68	203	350	519	680	915	3
Classical Curriculum Boys[8]	11.3	9.4	8.9	7.0	5.2	3.0	4
Classical Curriculum Girls[8]	3.9	5.9	6.5	5.3	5.1	3.2	5
Classical Curriculum Boys and Girls[9]	6.7	7.4	7.5	6.0	5.2	3.1	6
Scientific Curriculum Boys[8]	5.2	8.1	6.0	6.4	6.1	4.4	7
Scientific Curriculum Girls[8]	2.2	6.3	4.9	3.7	3.0	1.1	8
Scientific Curriculum Boys and Girls[9]	3.3	7.1	6.2	4.8	4.3	2.5	9
Total Boys[10]	16.5	17.5	16.9	13.4	11.3	7.4	10
Total Girls[10]	6.1	12.2	11.4	9.0	8.1	4.3	11
Boys and Girls[11]	10.0	14.5	13.7	10.8	9.5	5.6	12

[1] In 1887, 1890, 1905, and 1910 the total enrollment is 1 (for 1000) more or less than the sum of each enrollment by sex. This was caused by rounding off the figures to the nearest thousand. The figures and percentages representing both sexes are underscored for easy identification. The writer calculated the percentages. Those in line 12 are the sums of the two percentages underscored in lines 8 and 9.

[2] CR 1886-87, pp. 494-97, 512.

[3] CR 1889-90, II, pp. 1388-89.

[4] CR 1894-95, I, pp. 20-23, 38.

[5] CR 1899-1900, II, pp. 2122, 2129-30.

[6] CR 1904-05, II, pp. 816, 823-24.

[7] CR 1909-10, II, pp. 1135, 1143-45. Table A, p. 1139, is a convenient reference for the underscored percentages between 1890 and 1910, but not for enrollments. It also includes similar percentages for all other years between 1889-90 and 1909-10 except for 1906-07 to 1908-09 inclusive, when no data were collected.

[8] These percentages show the proportion of boys and the proportion of girls who were preparing for each of the two curricula in college.

[9] These percentages (underscored) were found by adding the number of boys and girls preparing for each of the two curricula in college and dividing that sum by the total enrollment of boys and girls.

[10] These two percentages show the proportion of boys and of girls preparing for both curricula in college.

[11] These percentages represent the sum of the percentages mentioned in Note 9.

portion to the total enrollment decreased after 1890 (line 12). This proportion was greatest in 1890 (line 12), when the actual number preparing for the two curricula was smallest (20,000),[1] and smallest in 1910, when the actual number was almost twice as large—51,000. The number in 1910, however, was 13,000 smaller than the number in 1905, 0,000 smaller than the number in 1900 and only 3,000 larger than the number in 1895.

These same developments also took place in the total number of boys (line 10) and of girls (line 11). Since the girls (line 2) always outnumbered the boys (line 1), it is not surprising that the proportion of girls preparing for the two curricula (line 11) was always less than the proportion of boys (line 10). Between 1890 and 1910, however, the actual numerical difference between boys and girls was insignificant, until 1910. Before that year girls comprised about 49% of the total preparing for both curricula. In 1910 their percentage fell to 43. This was also the percentage of girls in 1887.

Comparison of the total percentages for each of the two curricula shows that those for the classical (line 6) were consistently larger than those for the scientific curriculum (line 9). Among those of both sexes preparing for the classical curriculum, the girls consistently outnumbered the boys in actual figures, except in 1890. In that year for the first and only time the girls in the scientific curriculum (line 8) outnumbered the boys (line 7). Except for that year, there were more girls in the classical curriculum (line 5) than in the scientific (line 8). The boys in the classical curriculum (line 4) outnumbered those in the scientific (line 7), except in 1905 and 1910.

To conclude this brief analysis, two things must be emphasized. First, the percentages and figures just cited refer only to the high school students who were preparing for two specific curricula in college. These students made up only a relatively small percentage of the total high school enrollment (lines 3 and 12). Many other students were undoubtedly studying the same high school subjects. Although these subjects were not specified in the tables from which these statistics were taken, they were listed in other tables, and the number and percentage of all high school students who studied them were considerably greater in corresponding years than the figures and percentages in this table.[8]

In the second place, the table gives no statistics on the number of high school students who actually entered college. Information of that kind was given for the first time in the Biennial Survey of 1920-22. Before turning to the graduates and their college plans, however, it may be interesting to present some of the data in Table 24, arranged by regions rather than sex.

In 1890, as this table shows, five of the nine regions had more students preparing for the scientific curriculum in college than for the classical. All of these, with one exception—ESC—were in the Middle West, Southwest, and Far West. WSC had the greatest proportion of students in the classical curriculum; PAC, the greatest proportion in

TABLE 25[1]

PERCENTAGE OF HIGH SCHOOL STUDENTS GRADES 9-12 PREPARING FOR ONE OF TWO CURRICULA IN COLLEGE, BY REGION, IN 1890, 1900, AND 1910

	1890			1900			1910		
	CLASSICAL	SCIENTIFIC	TOT.	CLASS.	SCI.	TOT.	CLASS.	SCI.	TOT.
NE	11.7 3	4.9 7	16.6 4	11.5 1	4.7 5	16.2 1	9.0 1	4.1 1	12.1 1
MA	6.3 7	6.1 6	12.4 9	5.3 6	3.1 9	9.3 9	2.9 3	3.6 2	6.5 3
SA	12.1 2	3.1 9	15.2 6	9.9 2	2.4 9	11.4 6	3.6 2	1.2 7	4.9 4
ESC	6.2 8	6.6 5	12.8 7	8.7 3	5.0 4	13.7 4	2.1 7	1.4 5	3.5 8
WSC	12.4 1	7.0 4	19.3 2	6.9 4	4.0 7	10.9 7	2.8 4	1.2 7	4.0 7
ENC	4.6 9	7.0 4	11.6 9	4.4 9	4.4 5	9.8 8	2.3 6	2.1 4	4.4 6
WNC	8.4 5	10.2 2	18.8 3	4.9 8	6.7 3	11.6 5	1.6 9	1.4 5	3.0 9
MT	7.0 6	8.5 3	15.5 5	5.9 5	9.5 2	15.3 2	2.7 5	1.8 5	4.5 5
PAC	9.8 4	15.4 1	24.1 1	5.1 7	10.1 1	15.2 3	3.6 2	3.4 3	7.0 2
TOT. (US)	7.4	7.1	14.5	6.0	4.8	10.8	3.1	2.5	5.6

[1] For references, see Notes 3, 5, and 7 of Table 24. Occasionally the total percentage is 0.1 less or more than the sum of two percentages. Rounding off the percentages to the nearest decimal is the reason. The writer calculated all of the regional percentages. Those in the last line are found in CR 1909-10, II, Table A, p. 1139.

For regional enrollments in 1890 and 1900, and the states in each region, see Appendix F, Table 30. In 1910 the regional percentages in the table above were based on total enrollments, rather than on enrollments in the schools that returned usable questionnaires, on which subject percentages between that year and 1934 had to be based (see Appendix F, Table 30, Note 1). These regional enrollments were as follows: NE—95,881; MA—205,300; SA—43,021; ESC—34,840; WSC—50,733; ENC—241,537; WNC—155,012; MT—25,202; PAC—62,855. Total—915,081. For the sake of ready comparison the relative rank of each region is shown by the numbes under each percentage in each column. They should be read by column and not by row.

the scientific. PAC's overwhelming lead in the science field gave it the largest proportion of students preparing for college.[a]

By 1900, however, that lead had passed to NE, where it remained through 1010. In 1000 the scientific curriculum was leading in only three regions—WNC, MT, and PAC, and tied with the classical in another—ENC. The classical curriculum had a decided lead in the other five regions, and this lead again put it ahead throughout the country.

Although by 1010 the number of high school students was almost

double that of 1900 (see Table 24, line 3), the total number in each of the two curricula was less in 1910 than in 1900. Enrollments in the classical curriculum were less in all regions except NE, MT, and PAC; in the scientific curriculum, except NE, MA, SA, and PAC. Percentages for each of the two curricula continued to decrease in all regions except MA. In that region alone the number and percentage in the scientific curriculum were greater than in 1900, and greater than the percentage and number in the classical curriculum in 1910.

These decreases should not be misinterpreted. They do not mean that fewer high school students were studying classical and scientific subjects in 1910 than in 1900. They are simply the reflection of changes that were taking place both in high school and in college.

Between 1886-87 and 1889-90, for example, the list of undergraduate degrees which students might obtain increased markedly. In 1886-87 and 1887-88 the two courses, classical and scientific, were set apart from "other first-degree courses" not named. In 1888-89, A.B. and B.S. courses were listed specifically for the first time. The other courses listed were for the Bachelor of Letters, Bachelor of Philosophy, and Civil Engineering. In 1889-90, in addition to these, students could work for a Bachelor of Mechanical Arts, of Engineering, Agriculture, Architecture, Music, Pedagogy, Painting, Laws, and Divinity. By 1910, some of these degrees had dropped out of sight and a few others added—Scientific Agriculture, Fine Arts, Commercial Science, and several in Engineering. Separate tabulations for enrollments in the classical and scientific courses appeared in 1909-10 for the last time. In 1914-15, the familiar "arts and sciences" designation was used for the first time.[7]

In all these years students in the college classical course outnumbered those in all other courses down to 1910. In that year students in general science—the field not the subject—and in engineering together almost equalled the number in the classical course. Recipients of the A.B. degree, however, constituted the largest single group of graduates. But the distinction between A.B. and B.S. had begun to break down as early as 1890, when some colleges conferred the A.B. on students who had completed their college work without Latin or Greek.[8] It was impossible to trace this development, but undoubtedly the increasing lack of any clear-cut distinction between the A.B. and the B.S. made such a division more and more meaningless. Since 1915, as mentioned above, college students or graduates in arts and sciences have been grouped under that heading, to distinguish them from those in engineering, education, business, law, and a few other subject-

TABLE 26[1]

HIGH SCHOOL GRADUATES BY SEX AND REGION IN 1892-93, 1899-1900, AND 1909-10

	1893			1900			1910		
	B	G	T	B	G	T	B	G	T
NE	2,082	3,409	5,471	3,375	5,570	8,945	5,194	7,796	12,990
MA	2,302	3,984	6,284	4,704	7,772	12,476	9,095	13,747	22,842
SA	208	412	620	559	1,373	1,932	1,459	2,722	4,181
ESC	213	464	677	685	1,173	1,858	1,012	1.995	3,007
WSC	204	326	530	663	1,290	1,953	1,674	3,008	4,680
ENC	3,149	6,402	9,551	7,448	12,306	19,754	13,672	19,680	33,352
WNC	1,681	3,353	5,034	4,004	7,626	11,630	7,824	13,289	21,113
MT	123	267	390	388	693	1,081	1,062	1,669	2,731
PAC	314	537	851	749	1,359	2,108	2,665	3,802	6,467
TOTAL	10,256	19,154	29,410	22,575	39,162	61,737	43,657	67,706	111,363

[1] The references are as follows: CR 1892-93, I, p. 55; CR 1899-1900, II, p. 2130; CR 1909-10, II, p. 1143.

matter fields. As a result, the degree of Bachelor of Arts has become the generally accepted label in the liberal arts college, regardless of the student's undergraduate major.

Between 1890-91 and 1914-15 statistics were given on the number of high school graduates who were prepared for college. As indicated above, they did not indicate the number who actually entered. In 1909-10 and later, statistics were also given on the number prepared for higher institutions, other than college.[9] The first year in which fairly reliable figures could be arranged by sex and by geographical regions was 1892-93.

A comparison of Table 27 with Table 26 shows that the regions with the smallest numbers of graduates had the greatest proportion of students prepared for college. It is significant, perhaps, that two of the regions with the smallest percentages—NE and MA—were in the heavily industrialized area of the Upper Atlantic Seaboard. Although the other two—ENC and WNC[10]—were located in the great Farming Belt of the Middle West, they had many large industrial centers. Between 1893 and 1909 the lead in preparation for college shifted from the southern to the western part of the country. In 1910 the southern part was again in the lead. In all three years those two sections were considerably ahead of all others.

As Table 26 shows, girl graduates consistently outnumbered the

TABLE 27[1]

PERCENTAGE OF HIGH SCHOOL GRADUATES BY SEX AND REGION PREPARED FOR COLLEGE AND OTHER HIGHER INSTITUTIONS IN 1892-93, 1899-1900, AND 1909-10

	1893 COLLEGE			1900 COLLEGE			1910[2] COLLEGE			OTHER			
	B	G	T	B	G	T	B	G	T	B	G	T	GT
	1	2	3	1	2	3	1	2	3	4	5	6	7
NE	33.5	17.1	23.3	34.4	21.0	28.0	39.4	15.0	24.8	9.2	19.1	17.4	42.2
	8	8	8	9	8	8	9	9	8	6	2	2	9
MA	30.7	12.7	19.3	35.5	17.4	24.2	43.1	18.3	24.8	12.1	26.7	20.9	49.0
	9	9	9	7	9	9	7	8	8	1	1	1	7
SA	46.1	39.1	41.4	42.6	25.0	30.1	60.5	44.6	50.1	7.5	10.3	9.4	59.5
	5	4	5	3	6	6	1	1	1	7	8	9	1
ESC	83.9	78.4	83.3	41.0	30.8	34.4	54.0	33.8	40.6	9.9	10.3	10.1	60.7
	1	1	1	5	5	5	4	5	6	5	8	8	6
WSC	60.3	48.8	51.2	35.3	27.4	36.7	54.2	38.9	44.4	10.4	16.1	14.0	58.4
	3	2	2	8	2	4	3	3	3	3	3	3	2
ENC	42.1	23.3	29.5	36.9	24.4	29.1	41.8	27.8	33.6	10.7	15.4	13.4	47.0
	7	7	7	6	7	7	8	7	7	2	4	4	8
WNC	43.4	33.1	36.5	42.3	34.3	37.0	44.5	31.6	36.3	10.2	14.4	12.8	49.1
	6	6	6	4	4	3	6	6	6	4	6	5	6
MT	60.4	39.7	43.1	50.0	35.5	40.7	55.7	39.7	45.9	7.2	12.1	10.2	56.1
	4	3	4	2	3	2	2	2	2	8	7	7	3
PAC	65.3	35.0	46.2	50.5	39.8	43.6	50.2	34.8	41.1	6.3	16.3	11.6	62.7
	2	6	3	1	1	1	6	4	4	9	6	6	4
TOTAL	40.4	24.4	29.9	38.1	25.6	30.3	44.5	27.2	34.0	10.2	17.9	14.9	48.9

[1] References are the same as in Table 26, except for one addition in 1892-93. The number of graduates, by sex, prepared for college that year is found in CR 1894-95, I, pp. 81-83. The same reference contained similar data for the year 1891-92, but discrepancies between two sets of figures could not be reconciled. The figures underscored indicate the three regions with the highest percentages in a given year. For ready comparison the relative rank of each region is shown by the numeral under each percentage. They should be read by columns. Columns 1 and 2 give the percentage of each sex prepared for college; column 3, of both sexes together.

[2] The grand total (GT) in column 7 is the sum of columns 3 and 6. It shows the percentage of all graduates, boys and girls, prepared for all higher institutions.

hoys, and in some regions in 1893, two or more to one. With one exception, however—WSC in 1900—the proportion of boys prepared for college was consistently and considerably larger than that of girls. In MA the proportion was more than two to one in each of the three years. In NE it was almost two to one in 1893, and considerably more than two to one in 1910. These were the very regions, it is worth noting, with the greatest percentage of girls prepared for other higher institutions in 1910. In each of these two regions this percentage was more than twice as large as that for boys. In general, except for WSC and WNC, the proportion of boys and girls prepared for college was in sharp contrast with the proportion prepared for other higher

TABLE 28[1]
HIGH SCHOOL GRADUATES BY SEX AND REGION
IN 1920-21, 1932-33, AND 1936-37

	1921			1933			1937		
	B	G	T	B	G	T	B	G	T
NE	9,300	13,318	22,818	25,447	28,379	53,826	30,450	33,778	64,228
MA	20,183	27,715	47,898	81,583	63,538	125,121	102,338	109,708	212,044
SA	4,957	8,363	13,320	27,855	37,047	64,902	30,303	40,344	70,647
ESC	3,239	5,287	8,526	17,793	22,085	39,878	20,851	25,667	46,518
WSC	6,307	9,718	16,025	31,795	37,478	69,273	38,653	45,623	84,276
ENC	27,000	36,168	63,168	85,707	89,365	175,072	99,284	106,219	205,503
WNC	16,449	28,630	43,079	51,449	61,877	113,326	56,516	64,729	121,247
MT	3,308	5,292	8,600	15,096	16,892	31,988	17,504	18,722	36,226
PAC	8,588	11,826	20,414	35,756	36,232	71,988	40,328	41,336	81,664
TOTAL	99,331	144,317	243,648	352,461	392,693	745,374	436,227	486,128	922,353

[1] References are as follows: BS 1920-22, II, pp .559-60; BS 1932-34, Ch. V, pp. 57-58; BS 1936-38, Ch. V, pp. 73-75.

institutions. If the regions are ranked in each category, given in the order just mentioned, this contrast is made clear: NE, 8-2; MA, 8-1;[11] SA, 1-9; ESC, 5-8; WSC, 3-3; ENC, 7-4; WNC, 6-5; MT, 2-7; PAC, 4-6. A similar comparison of sex with sex in the two categories follows approximately this same pattern.

Preparation for college by both sexes together and by girls alone increased throughout the seventeen-year period.[12] Between 1893 and 1000 the total percentage for boys decreased slightly. Three of the regions—ESC, WSC, and PAC—had such decided drops that the accuracy of the figures in 1893 might well be questioned, but the figures given yielded the percentages as listed. Between 1000 and 1010 the first two regions made a strong comeback; PAC was the only region out of the nine that showed a continued decrease for boys—although it was slight—in 1010. Along with WNC and NE it also showed a decrease for girls, and in all three cases that decrease brought the total percentage of each below that of 1000.

From information given in the sources it could not be determined whether the data for 1893 and 1000 included the number of graduates prepared for higher institutions other than liberal arts colleges. In 1010, when these data were specifically added, over 60% of boys were prepared for higher institutions in four regions—SA, ESC, WSC, and MT; over 50% in four other regions, and slightly under 50% in only

TABLE 29[1]

PERCENTAGE OF HIGH SCHOOL GRADUATES BY SEX AND BY REGION ATTENDING COLLEGE AND OTHER HIGHER INSTITUTIONS IN THE FALL FOLLOWING THEIR GRADUATION IN 1920-21, 1932-33, 1936-37

	1921[2]						1933						1937					
	College			Other			College			Other			College			Other		
	B	G	T	B	G	T	B	G	T	B	G	T	B	G	T	B	G	T
	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6
NE	30.7	12.8	20.2	13.5	20.6	17.7	17.1	12.9	14.9	5.3	7.5	6.5	17.8	14.0	15.8	6.7	9.5	8.2
	9	9	9	2	2		9	9	9	1	2	2	9	9	9	1	2	1
MA	42.7	18.7	28.8	15.1	26.9	21.9	24.0	18.9	21.5	4.4	9.4	7.0	26.7	20.1	23.3	5.1	9.8	7.5
	5	8	8	1	1		4	6	5	2	1	1	4	7	6	2	1	2
SA	54.5	37.8	44.0	7.3	13.6	11.3	30.0	25.2	27.3	2.0	4.4	3.4	30.7	28.1	29.2	3.2	4.8	4.1
	1	2	2	6	5		1	3	3	5	4	4	3	3	3	4	7	6
ESC	44.8	28.8	34.9	8.1	16.3	13.2	29.0	27.1	27.9	1.9	3.1	2.6	34.3	31.0	32.5	2.9	4.6	3.8
	3	5	5	5	4		2	1	1	6	8	8	2	2	2	6	8	8
WSC	48.8	42.0	44.6	8.4	10.5	9.7	21.8	20.0	20.8	1.8	2.4	2.1	26.2	23.4	24.7	2.9	4.6	3.9
	2		1	4	8		6	5	6	7	9	9	6	5	5	6	8	7
ENC	36.4	25.9	30.4	10.7	17.4	14.5	19.1	17.0	18.1	1.9	3.6	2.8	21.5	18.9	20.2	2.6	5.2	3.9
	8	6	6	3	3		8	8	8	6	7	7	8	8	8	7	5	7
WNC	36.7	24.9	29.4	6.6	12.3	10.1	20.4	18.6	19.4	2.0	3.8	3.0	23.8	21.7	22.6	2.9	5.6	4.3
	7	7	7	7	7		7	7	7	5	6	6	7	6	7	6	4	4
MT	44.7	32.6	37.2	4.8	10.1	8.1	22.5	21.8	22.3	2.2	3.9	3.1	26.4	24.8	25.6	3.1	5.1	4.2
	4	3	3	9	9		5	4	4	4	5	5	5	4	4	5	6	5
PAC	40.8	31.1	35.2	5.6	13.4	10.1	28.9	26.3	27.6	2.6	4.7	3.9	35.0	32.3	33.6	3.5	6.1	4.8
	6	4	4	8	6		3	2	2	3	3	3	1	1	1	3	3	3
TOTAL	39.8	25.7	31.4	10.1	17.3	14.4	22.8	19.9	21.1	2.7	4.9	3.9	25.9	22.4	24.0	3.7	6.5	5.2

[1] For references, see Note 1 of Table 28. For explanation of numerals under each percentage, see Note 1 of Table 27.

[2] The total percentages in columns 2, 3, 4, 5, and 8 do not agree with comparable percentages given in BS 1932-34, Ch. V, Table G, p. 13 (repeated in BS 1936-38, Ch. V, Table H, p. 15). If the percentages in Table G were based on the figures given in BS 1920-22, II, p. 559, which the writer used, his percentages in this table are believed to be correct. The writer's total percentages for 1933 agree with those in Table G, except in column 8, which is 8.8 in Table G. For 1937, Table H (see above) has 3.8 for the writer's 3.7 (Col. 4). Regional percentages were not calculated in any of the official reports cited.

one—NE. Of girls, four regions had over 50%—SA, WSC, MT, and PAC; only one region—NE again—had under 40%. Of boys and girls, three regions—SA, WSC, and MT—had over 55%; two others over 50%—ESC and PAC; and only NE, under 45%.

None of these statistics, as was pointed out above, indicated what proportion of graduates actually entered higher institutions. That information was first given for the graduates of 1921 (Tables 28 and 29). This was undoubtedly one factor in the general decreases that took place between 1910 and 1921. Since data on preparation and performance are not really comparable, the increases shown by some of the regions in one or more of the categories are noteworthy. The increase of boys entering other higher institutions in NE and MA

raised the total percentage of boys entering both types in MA, but not in NE. The percentage of girls entering college increased in MA and WSC; of girls entering other higher institutions, in NE, MA, SA, ESC, and ENC; of girls entering both types, in MA, ESC, and ENC. Only MA, however, had an increase in the total percentage of boys and girls entering both types.[13]

The general decline between 1915 and 1921 was continued and accentuated by the depression in 1933. Between 1921 and 1933, as might have been expected, decrease in the percentage of those going to college was proportionately greater for boys than for girls. At the same rate of decrease, the percentage for girls in 1933 would have been 14.7 instead of 19.9. As also might have been expected, decrease in the percentage of those going to other higher institutions was proportionately greater than the decrease of those going to college. This decrease was proportionately greater for boys than for girls, although the difference was slight. At the same rate of decrease the percentage would have been 4.6 for the girls instead of 4.9. Among the nine regions none showed an increase in the percentage of boys going to college. Only NE and MA showed slight increases in the percentage of girls. All regions had decreases in the percentage of each sex going to other higher institutions. There were remarkably small differences in any region between the percentage of boys and of girls going to both types of institutions. In MT the percentage of girls was actually 1.0 larger than that of boys; in WNC both percentages were the same. In all other regions the percentage for boys was slightly higher. On a national scale the percentage for boys was 25.5; for girls, 24.8.

In the short span between 1933 and 1937 the national percentages increased to 29.6 and 28.9 respectively. The difference between the two was exactly the same as the comparable difference in 1933—0.7%. Apparently the Great Depression was also the Great Equalizer of educational opportunities.

This fact is borne out also among the regions. In five regions the proportion of boys continuing education beyond high school was less than 2% larger than that of girls; in two regions the proportion of girls was slightly larger—WNC and MT; and in one—ENC—the proportion was the same for each. In still another—PAC—the proportion of boys was only 0.1% larger.

As Table 29 shows, between 1921 and 1933 the percentage of each sex attending college decreased proportionately less than the percentage attending other higher institutions. Between 1933 and 1937 the

percentage of each sex attending college increased proportionately less than the percentage attending other higher institutions.

In 1910 (Table 27) the percentage of each sex *prepared* for college was highest in SA, MT, and WSC. In 1921 (Table 29) the percentage *going* to college was highest in WSC, SA, and MT; in 1933, in ESC, PAC, and SA; in 1937, in PAC, ESC, and SA. The percentage of each sex prepared for or going to other higher institutions was highest in MA, NE, and WSC in 1910 and 1921 (with ENC in place of WSC); in MA, NE, and PAC in 1933 and 1937. In each of these years the proportion prepared for or actually entering college was less in NE than in any other region. Its greater number of private schools for both sexes was undoubtedly the primary reason.

In 1910 the actual number of boys prepared for college was for the first time slightly larger than the actual number of girls. The number of girls prepared for other higher institutions, however, was so much larger than the number of boys that in both categories combined girls outnumbered boys. This same development prevailed through 1937. Since girls have continued to outnumber boys in high school and in graduation from it, more girls than boys may have entered institutions of higher learning each year since 1937.[14] Unfortunately that was the last year in which figures on continuation beyond high school could be divided by region, sex, and types of institution. Available data indicate, however, that the percentage of high school graduates continuing their education has been rising since 1937. In 1940 the percentage was 35.2, and in 1952, 44.8, but both of these were based on statistics from all secondary schools, private and public.[15] In the fall of 1953 the number of first-time college students, exclusive of veterans, was 607,570. They constituted 50.7% of graduates of the preceding June in all public and non public secondary schools.[16] If the veterans enrolled in college for the first time had been included, the percentage would have been 55.4.

Since the percentages just cited and the figures on which they were based include part-time as well as full-time students in college, the difficulty of determining the percentage of public high school graduates attending college is clearly obvious. Nevertheless, on the basis of a comparison with the situation in 1937 and 1951, when the facts were known, a reasonable estimate may be made for 1953.

In 1937 there were 367,983 first-time college students, of which 269,631, or 73.3%, were from public high school graduates. The remaining students, 98,352, or 26.7% came from nonpublic secondary school graduates.[17] The total number of graduates from all types of

secondary schools in the preceding June was 1,067,712, of which the number from public high schools was 922,353, or 86.4%. In 1951 the public high schools graduated 1,045,588 students,[18] or 88.5% of secondary school graduates. If it is assumed that high school graduates constituted 75% of first-time college students that fall, instead of 73.3% as in 1937, then approximately 38% of their 1951 graduates entered college that fall.[19] By 1953, when the veterans in college for the first time were counted separately, that uncertainty is removed from the calculations. If the percentages used for 1951 are used for 1953, approximately 43% of the high school graduates entered college in the fall of that year. If the 1951 percentages are increased from 88.5 to 99, and from 75 to 80, approximately 45% of the public high school graduates in 1953 entered college in the following fall. Neither percentage, of course, could distinguish between full or part-time students.

According to the United States Office of Education there were 735,995 first-time college students in the fall of 1956. This was approximately 55.7% of the June graduates from all types of secondary schools.[20] If it is assumed that the public high school graduates constituted 99% of the 1,318,799 secondary school graduates, and 89% of the first-time college students cited above, 49.5% of public high school graduates in June 1956 entered college that fall. This compares favorably with the estimates made by the Office of Education: of the 1956 June graduates of public high schools, 42% enrolled in college on a full-time basis, 8% were part-time students.[21] It also suggests that the writer's estimates for 1953 were approximately correct.

The avalanche has indeed begun.

[1] CR 1888-87, p. 497. The other data mentioned are given on pp. 496 and 512.

[2] See Note 7 of Table 24.

[3] The statistics in this Report were collected primarily from city school systems and were far from being complete or representative.

[4] The number in 1887 was much smaller—6,800—but the figures for that year, as pointed out in Note 3, above, were far from complete.

[5] For a comparison, see Chapter IV, Table 2 (foreign languages), 3 (science), 1 (mathematics).

[6] As the total US percentages in columns 1 and 2 show, students in the two curricula were almost equally divided—14,989 to 14,520 in actual figures. Four regions—NE, MA, ENC, and WNC—accounted for 12,863 and 12,648 of these respectively.

[7] CR 1915-18 (for the year 1914-15), II, p. 248. References for the other years mentioned are: CR 1909-10, II, pp. 856-881; CR 1889-90, II, pp. 774-77. The last reference includes data for 1886-87 through 1888-89.

[8] CR 1889-90, II, p. 772. Most likely some colleges were doing so before 1890.

[9] Normal schools were the only type identified in 1910 (CR 1909-10, II, p. 1131). The others undoubtedly included agricultural and mechanical colleges, sometimes referred to as schools of science; schools of medicine, law, and theology.

[10] In 1900, WNC had a larger percentage of boys prepared for college than ESC and WSC; a larger proportion of girls than SA and ESC, and a larger proportion of both than SA, ESC, and WSC. This was not true in the other two years.

[11] MA tied with NE for eighth place in percentage prepared for college.

[12] In 1891, the percentage was 28.6 for boys and girls together (CR 1890-91, II, pp. 792-93). A breakdown by sex could not be made.

[13] It is interesting to note that the upward trend between 1803 and 1910 continued through 1914-15. In that year the national percentage of boys prepared for college increased to 45.4; for other higher institutions, to 10.8; for both, to 56.2. The percentage of girls prepared for college reached 29.3; for other higher institutions, 19.9; for both, 49.2. The percentage of boys and girls prepared for college reached 35.9; for other higher institutions, 16.2; for both, 52.1. CR 1915-16 (for 1914-15), II, pp. 454-55.

[14] The dropout rate for girls is evidently much higher than that for boys. Otherwise it is difficult to explain why men in higher educational institutions have consistently outnumbered women and by considerable margins. For a summary by decades between 1890 and 1920 and for 1922, see BS 1920-22, II, pp. 207-98. For a summary of enrollments and degrees by sex and type of institution between 1900 and 1938, see BS 1936-38, Ch. IV, pp. 43-5. For the latest figures, see *Earned Degrees* for 1055-56.

[15] BS 1950-52, Ch. 1, Table 6. Percentages were calculated by the writer. In 1953-54 the percentage was 51.2 (BS 1953-54, Ch. 1, Table 6).

[16] BS 1952-54, Ch. 4, Section 1, Table XXIV, p. 58.

[17] *Ibid.*, and BS 1936-38, Ch. V, p. 73. These are also the references for the figures used in the calculations to follow, unless otherwise indicated.

[18] BS 1950-52, Ch. 5, Table 17. The writer calculated the percentage.

[19] Since the total number of first-time college students—529,950—included an indeterminable number of veterans, the percentage is undoubtedly too large.

[20] The figures were taken from an Associated Press report published by the *Washington Post and Times Herald* (October 28, 1956). The percentage, calculated by the writer, was based on figures published in mimeographed form by the Office of Education as of September 21, 1956. See Appendix G, Note 12.

[21] The percentages were given to the writer by telephone on November 15, 1956. If the public high-school graduates listed for 1955-56 in Appendix G, Table 38, are used, the percentage attending college that fall would be 50.3.

APPENDIX E

SPECIAL PROBLEMS IN 1949

For 1948-49 there were certain difficulties in estimating individual subject percentages in four different subject-matter fields: vocational and nonvocational subjects, physical education, art, and music. These difficulties were caused by the nature of the subjects and by the way subject enrollments were reported to the Office of Education. Many reports did not completely break down subject enrollment by grades. Since this study deals primarily with subject enrollments in grades 9-12, it was felt that some attempt should be made to bring the 1948-49 percentages into line with those of the preceding years. The procedure used is a bit complicated, but the writer could find no other.

Explanation for Table 7, Chapter IV

In Chapter 5 of the Biennial Survey for 1948-50, Table 3 gives enrollments for each of 13 different subjects in Industrial Arts—Nonvocational. Each subject enrollment was divided by the total high school enrollment for the individual subject percentage. The addition of each subject enrollment divided by the total high school enrollment gave the percentage of the whole subject matter field. That percentage was 32.4. Duplicates, of course, could not be excluded.

Chapter 5 did not contain percentages for the 13 separate subjects. It did, however, give the total enrollment and percentage for the whole field—26.6 (Table 7). Since this percentage was smaller than the one mentioned above, it was obvious that the individual percentages, also mentioned above, were a little too large. The smaller individual percentages were determined by the following proportion: 32.4: 26.6 *as* A: X. For A, substitute each of the 13 individual percentages; the result would give X for each of the 13 subjects.

But it was also fairly clear that only five of the subjects would be suitable for students below grades 9-12. Accordingly the proportion was worked out for those five subjects; the percentages for the other eight were kept as they were computed originally. The 13 percentages

then added up to 27.9. The difference between 27.9 and 26.6 came from the fact that the proportion was worked out on the assumption that it would be applied to all percentages. Since it was applied to only five, the proportion was not quite accurate for those five. Although corrective adjustments would have been easy by a "seaman's eye," it was decided to let the five percentages stand as they appear in Table 7 of the text. They are marked with an asterisk.

Explanation for Table 10

Solution of a similar problem in Health, Safety, and Physical Education involved a slightly different approach from the one used above. In this case Table 3 of Chapter 5 gave enrollments in each of 6 different subjects. Table 7 gave the correct official percentage for one, physical education. The problem was to find the corrected percentage for each of the writer's subject percentages. The proportion, therefore, took this form: The writer's P.E. percentage: official percentage *as* the writer's percentage for another subject: X. Since two of the subjects, driver education and military drill, were probably not taught below grades 9-12, corrections were not applied to them. This undoubtedly threw the corrections for safety, health, and hygiene slightly off. In the case of safety education this assumption is apparently verified by the statement (Ch. 5, pp. 24-5) that almost 4% of all secondary students were studying it in 1948-49. The writer's original percentage for the subject was 4.7. His corrected percentage is a bit too small; 3.6 or 3.7 would probably be about right. The writer's original percentage for driver education, 3.8, seemingly checks with another official statement: that "almost 4% of all pupils in regular and senior high schools" received driver training (*Ibid.*, p. 25).

Explanation for Table 11

The procedure used in nonvocational subjects was also used in Music, for which only the official percentage of 30.1 was given (Ch. 5, Table 7). Corrections were applied to all subjects except harmony, theory and practice. The individual corrected percentages, plus the original percentages for those two subjects, added up to 30.1. The original percentages totaled 46.0.

Explanation for Table 12

The problem in Art was a little more complicated than that of any other subject-matter field. As in the case of nonvocational subjects and of music, only an official total percentage was given—9.0 (Ch. 5,

Table 7). This total contrasted sharply with the writer's total percentage, 24.2, which was the sum of the individual percentages derived from the subject enrollments given in Chapter 5, Table 3.

Although the corrective procedure, previously described, yielded a total of 9.0% when it was applied to all of the seven art subjects, some of the individual percentages seemed out of line with official estimates. For instance, it was stated (Ch. 5, p. 25) that freehand drawing and art appreciation each enrolled "approximately 5.5% of the pupils in all types of schools combined." The writer's percentages for these two subjects, based on enrollments given in Table 3, were 7.1 and 6.9. The corrected percentages were 2.6 and 2.5 respectively. The writer's percentage for general art, 4.7, was corrected to 1.8% Both of these figures contrasted with the official percentage of 3.7 "of the total secondary school enrollment" (p. 26) in general art. There was an even greater contrast in general service art. The writer's percentage, 1.7, was corrected to 0.6. The official percentage was 0.1 of enrollments "in all public secondary schools" (p. 26).

The percentage differences just mentioned undoubtedly resulted from the difference between enrollments in *all* public secondary schools and enrollments in the last four years of such schools. If this was the situation in Art, similar situations must have existed in the other three subject-matter fields mentioned in this Appendix. Although the writer's corrected total percentages agree with the official percentages, except in the case of nonvocational subjects—and even they could have been brought into line—his individual corrected percentages in many instances are undoubtedly wrong. Perhaps the overall picture, however, is the important thing.

APPENDIX F

CUMULATIVE SUBJECTS BY REGION

Tables 1-13 of Chapter IV show the changes that took place between 1890 and 1949 in the proportion of high school students enrolled in thirteen different subject-matter fields throughout the United States. The tables in this appendix show the corresponding changes in three of those fields—mathematics, foreign languages, and science, in each of nine geographical regions. Table 30 gives the total high school enrollments in each region, on which the subject-percentages in Tables 31-33 are based. For the sake of ready comparison, a summary table is added—No. 34—which corresponds to Tables 14 and 15 of Chapter V. A final table, No. 35, permits another kind of comparison: the correlation between regional rankings based on the proportion of high school students and college majors in the various subjects and subject-matter fields.

From these tables certain facts stand out. Although proportionate concentration in individual subjects shifted considerably, the lead in the fields of science and mathematics was in the southern part of the country between 1890 and 1934. In 1949 the lead in mathematics remained there, but in science it shifted to the Middle Atlantic Region, where it undoubtedly is today.[1] The lead in foreign languages was in the South in 1890, but after that year it was in New England, with MA next, after 1900. SA was in third place between 1910 and 1934, but had dropped to sixth in 1949.

In comparative rankings the relationships between mathematics and science are rather consistent and close in most of the regions. The glaring exceptions are in NE in 1890, MT and PAC in 1900, MA in 1910, WSC in 1934, NE and MA in 1949, and NE, MA, ENC, and WSC in 1955.[2] No such relationship as this is apparent between foreign languages and either of the other two fields.

Although many high school students go to college outside of their own regions, the great majority do not. The comparative rank of the regions in these three cumulative subject-matter fields, therefore, may

TABLE 30[1]

HIGH SCHOOL ENROLLMENTS GRADES 9-12 IN NINE GEOGRAPHICAL REGIONS[2] IN CERTAIN YEARS BETWEEN 1889-90 AND 1954-55

	1890	1900	1910	1922	1934	1949
NE	35,492	83,392	81,912	174,121	328,458	309,274
MA	45,551	114,452	118,575	479,673	1,114,888	1,180,018
SA	5,802	18,574	34,198	135,978	312,098	820,646
ESC	3,918	18,808	24,960	82,937	180,750	388,550
WSC	4,900	20,881	36,033	148,402	328,187	509,707
ENC	67,088	159,010	187,701	532,215	1,113,870	1,098,852
WNC	33,558	95,806	121,138	338,135	552,151	580,016
MT	1,819	10,349	20,167	82,297	164,828	207,358
PAC	4,835	17,999	49,549	181,814	401,508	525,035
TOTAL US	202,983	519,251	739,143	2,155,460	4,498,514	5,399,452

[1] References are given in Appendix B. For the special situation between 1910 and 1934 inclusive, see Appendix G, Notes 2-4. Since there has been no national curriculum survey since 1948-49, regional enrollments since then are not available. Total enrollment in 1954-55 is an estimate (see *School Life*, May 1955).

[2] States in each region are as follows—

NE (New England): Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

MA (Middle Atlantic): Delaware, District of Columbia, Maryland, New Jersey, New York, and Pennsylvania. In the Commissioners' Reports the last three states were grouped with the New England States to form a North Atlantic Division. The first three states were grouped with the states in SA, to form a South Atlantic Division. The re-grouping used here conforms to the regional scholastic associations to which the schools in all these states belong.

SA (South Atlantic): Florida, Georgia, North and South Carolina, Virginia, and West Virginia.

ESC (East South Central): Alabama, Kentucky, Mississippi, and Tennessee. These states and those in WSC formed a South Central Division in the Commissioners' Reports. The grouping used here and below follows the regional boundaries of the Census Bureau.

WSC (West South Central): Arkansas, Louisiana, Oklahoma, and Texas.

ENC (East North Central): Illinois, Indiana, Michigan, Ohio, and Wisconsin. These states were combined, in the Commissioners' Reports, with those in WNC, to form a North Central Division.

WNC (West North Central): Iowa, Kansas, Minnesota, Missouri, Nebraska, North and South Dakota.

MT (Mountain): Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming. These states were formerly included with those listed in PAC, to form a Western Division.

PAC (Pacific): California, Oregon, Washington.

have some relationship with the order of rank based on college majors in these fields. The high school graduates of 1948-49 would theoretically have finished college in 1952-53. Table 35 is for 1953-54 college graduates, but it may afford some interesting comparisons—and speculations.

TABLE 31[1]

PERCENTAGE OF HIGH SCHOOL STUDENTS GRADES 9-12 ENROLLED IN SCIENCE BY GEOGRAPHICAL REGION IN CERTAIN YEARS BETWEEN 1889-90 AND 1953-54

	NE	MA	SA	ESC	WSC	ENC	WNC	MT	PAC	US	LINE
Enrollment	3	2	5	8	6	1	4	9	7		(1890)
Physics	23.1 8	19.4 9	34.2 2	21.6 7	43.4 1	21.2 8	24.6 4	28.5 3	24.0 5	22.8	1
Chem.	13.9 3	8.0 8	9.4 6	5.0 9	14.0 2	0.1 7	10.1 4	9.9 5	17.8 1	10.1	2
TOT.(2)[2]	37.0 5	27.4 8	43.6 2	26.6 9	57.4 1	30.3 7	34.7 6	38.4 4	41.8 3	32.9	5
Enrollment	4	2	7	6	5	1	3	9	8		(1900)
Physics	19.1 7	18.0 8	20.0 4	23.8 2	26.4 1	17.4 0	20.2 3	19.4 5	10.2 6	19.0	1
Chem.	11.1 3	6.6 7	8.0 4	6.2 9	6.6 8	7.0 5	6.9 6	12.6 1	11.6 2	7.7	2
TOT.(2)[2]	30.2 4	24.6 6	28.0 6	30.0 5	33.0 1	24.4 9	27.1 7	32.0 2	30.8 3	26.7	6
OTH.SCI.[3]	36.6 6	58.9 4	75.5 3	79.9 2	94.8 1	58.1 6	56.6 0	47.0 7	31.7 9	57.2	6
Enrollment	4	2	7	6	6	1	3	9	6		(1910)
Physics	16.2 3	14.3 5	14.5 4	18.2 1	17.5 2	14.4 6	14.2 7	14.3 6	11.1 8	14.6	1
Chem.	8.7 1	7.6 3	5.4 7	4.1 9	5.0 8	6.5 6	6.0 5	8.0 2	7.7 4	8.0	2
Biol.	0.2 4	3.6 1	0.2 6	0.6 3	0.0 9	0.2 4	0.1 5	0.8 2	0.0 3	1.1	3
TOT.(3)[2]	25.1 2	25.7 1	20.1 8	22.9 4	22.5 5	21.1 6	20.3 7	23.1 3	19.4 0	22.8	5
OTH.SCI.[3]	30.5 0	66.4 5	77.7 1	66.1 3	78.1 2	66.9 4	54.7 6	61.2 7	35.0 8	59.0	6
Enrollment	6	2	7	6	6	1	3	9	4		(1922)
Physics	8.6 3	6.8 3	7.1 5	0.4 2	7.6 4	9.4 2	11.0 1	7.0 6	7.1 5	8.0	1
Chem.	6.7 2	6.3 3	6.2 4	7.5 6	6.2 6	7.2 7	4.9 9	7.9 5	9.7 1	7.4	2
Biol.	6.6 6	18.6 1	9.9 3	12.6 2	4.3 6	5.5 7	3.3 9	7.6 4	6.9 5	6.8	3
Gen. Sci.	19.5 3	16.6 7	24.5 1	19.3 4	12.6 9	19.7 5	17.9 6	19.2 6	16.6 7	18.3	4
TOT.(4)[2]	42.6 4	52.5 1	40.7 2	49.0 3	30.7 9	41.6 6	37.1 8	41.7 6	39.0 7	43.4	5
OTH.SCI.[3]	6.6 0	7.9 6	14.4 5	17.6 4	27.2 1	20.6 2	18.4 3	10.9 6	8.8 7	14.9	6

[1] The numbers under the regions rank them by size of high school enrollments. There were six shifts in 1900, three in 1910, two in 1922 and in 1934, and none in 1949. For the

	NE	MA	SA	ESC	WSC	ENC	WNC	MT	PAC	US	LINE
Enrollment	5	1	7	6	6	2	3	9	4		(1034)
Physics	7.5 2	5.6 5	4.6 8	5.2 6	4.1 9	7.4 3	8.2 1	6.1 4	5.0 7	6.3	1
Chem.	10.2 1	7.0 7	7.6 6	6.1 4	6.2 6	8.0 5	5.5 9	9.5 2	6.3 3	7.6	2
Biol.	12.9 6	12.6 9	20.9 1	16.7 2	13.9 6	15.0 5	15.6 4	15.7 3	13.5 7	14.6	3
Gen. Sci.	18.5 4	17.9 5	23.3 1	19.7 2	16.9 3	16.9 6	16.9 3	14.3 7	12.8 8	17.6	4
TOT.(4)[2]	49.1 3	43.1 7	56.6 1	49.7 2	43.1 7	47.3 5	48.2 4	45.6 6	39.6 8	46.3	5
OTH.SCI.[3]	3.6 8	1.8 9	4.1 7	5.6 5	7.4 2	7.8 1	5.9 4	6.8 3	4.6 6	5.1	6
Enrollment	5	1	7	8	0	2	3	9	4		(1949)
Physics	7.4 1	7.1 2	3.8 8	3.9 7	2.5 9	6.2 3	5.8 4	4.9 5	4.2 6	5.4	1
Chem.	10.0 1	9.1 2	7.6 5	7.1 6	5.4 9	7.9 4	5.7 6	6.2 3	5.7 7	7.8	2
Biol.	16.6 6	17.2 6	22.5 1	18.9 4	16.6 7	19.4 2	17.9 5	10.0 3	17.2 6	16.4	3
Gen. Sci.	20.1 0	26.6 1	21.9 3	22.7 2	20.8 5	16.9 7	21.3 4	14.5 9	15.3 8	20.8	4
TOT.(4)[2]	54.1 3	60.0 1	50.0 2	52.5 4	45.5 6	50.4 6	50.7 5	45.8 7	43.4 9	52.2	5
OTH.SCI.[3]	2.2 3	1.7 6	0.5 9	1.2 8	1.4 7	1.9 5	2.0 4	3.1 2	3.8 1	1.9	5
											(1954[4])
Physics	6.8 1	5.8 3	3.3 7	5.3 4	4.4 6	6.3 2	4.5 5	5.3 4	2.9 8	5.1	1
Chem.	9.4 3	9.6 1	6.5 6	7.9 4	9.5 2	6.9 5	5.1 7	9.4 3	5.0 8	7.1	2
Biol.	14.3 9	25.2 3	20.2 6	17.2 7	26.4 1	21.4 5	15.0 8	26.1 2	25.0 4	21.2	3
Gen. Sci.	13.0 8	18.4 5	15.5 7	27.9 1	17.1 4	25.9 2	19.9 3	11.9 9	16.3 8	10.8	4
TOT(4)	44.4 8	56.8 4	45.5 7	58.3 2	57.4 3	60.5 1	44.5 7	52.7 5	49.2 6	53.2	5

special situation in 1954, see Note 4 below. The numbers under the percentages rank the regions by subject-percentage size. Regions with the same percentage are given the same rank. The sequence of size, from largest to smallest, begins with number 1.

[2] Since the subject enrollments in each region are divided by the same high school enrollment, the percentages may be added. The resulting total percentage represents the equivalent of that many students enrolled in science, by region, and for the whole country, in a given year. Multiple enrollments—students enrolled in more than one course—could not be determined. In 1890 only two science subjects, physics and chemistry, were listed. The percentages in lines 5 and 6 were therefore the same. Biology was first listed in 1910, general science, in 1922. These four science subjects received individual treatment because after 1910 they were the four principal subjects in science.

	NE	MA	SA	ESC	WSC	ENC	WNC	MT	PAC	US	LINE
Enrollment	5	1	7	8	6	2	3	0	4		(1634)
Physics	7.5 2	5.8 5	4.6 8	5.2 6	4.1 9	7.4 3	8.2 1	6.1 4	5.0 7	6.3	1
Chem.	10.2 1	7.0 7	7.8 8	8.1 4	0.2 8	8.0 5	5.5 6	0.5 2	8.3 3	7.6	2
Biol.	12.9 8	12.6 6	20.9 1	16.7 2	13.0 6	15.0 5	15.6 4	15.7 3	13.5 7	14.8	3
Gen. Sci.	18.5 4	17.0 5	23.3 1	10.7 2	18.0 3	10.0 5	18.0 3	14.3 7	12.8 8	17.8	4
TOT.(4)[2]	40.1 3	43.1 7	56.6 1	49.7 2	43.1 7	47.3 6	48.2 4	45.6 6	36.6 8	46.3	5
OTH.SCI.[3]	3.8 8	1.8 9	4.1 7	5.6 5	7.4 2	7.8 1	5.0 4	6.8 3	4.8 6	5.1	6
Enrollment	5	1	7	8	6	2	3	6	4		(1949)
Physics	7.4 1	7.1 2	3.8 8	3.0 7	2.5 0	6.2 3	5.8 4	4.6 6	4.2 6	5.4	1
Chem.	10.0 1	9.1 2	7.8 5	7.1 6	5.4 0	7.0 4	5.7 8	8.2 3	6.7 7	7.6	2
Biol.	16.8 8	17.2 8	22.5 1	18.0 4	16.8 7	19.4 2	17.0 5	16.6 3	17.2 8	18.4	3
Gen. Sci.	20.1 6	26.6 1	21.9 3	22.7 2	20.8 5	16.0 7	21.3 4	14.6 6	15.3 8	20.8	4
TOT.(4)[2]	54.1 3	60.0 1	56.0 2	52.6 4	45.5 8	50.4 6	66.7 5	46.6 7	43.4 0	62.2	5
OTH.SCI.[3]	2.2 3	1.7 6	0.6 6	1.2 8	1.4 7	1.9 5	2.0 4	3.1 2	3.8 1	1.9	6
											(1954[4])
Physics	6.8 1	5.8 3	3.3 7	5.3 4	4.4 6	6.3 2	4.5 5	5.3 4	2.9 8	6.1	1
Chem.	9.4 3	9.6 1	6.5 6	7.9 4	2.5 2	6.9 5	5.1 7	9.4 3	5.0 8	7.1	2
Biol.	14.3 9	25.2 3	20.2 6	17.2 7	26.4 1	21.4 5	15.0 8	20.1 2	25.0 4	21.2	3
Gen. Sci.	13.0 8	16.4 5	15.5 7	27.2 1	17.1 4	25.9 2	19.9 3	11.6 0	16.3 0	16.8	4
TOT(4)	44.4 8	56.8 4	45.5 7	58.3 2	57.4 3	60.5 1	44.5 7	52.7 5	46.2 6	53.2	5

special situation in 1954, see Note 4 below. The numbers under the percentages rank the regions by subject-percentage size. Regions with the same percentage are given the same rank. The sequence of size, from largest to smallest, begins with number 1.

[3] Since the subject enrollments in each region are divided by the same high school enrollment, the percentages may be added. The resulting total percentage represents the equivalent of that many students enrolled in science, by region, and for the whole country, in a given year. Multiple enrollments—students enrolled in more than one course—could not be determined. In 1890 only two science subjects, physics and chemistry, were listed. The percentages in lines 5 and 6 were therefore the same. Biology was first listed in 1910, general science, in 1922. These four science subjects received individual treatment because after 1910 they were the four principal subjects in science.

[3] For all science subjects listed, see Ch. IV, Table 3. It will be noted that the total percentages in that table are the same in a given year as those for the US given in Line 6 of this table.

[4] The percentages for 1954 are based on data collected by the writer in the spring of that year, on the subjects listed. Although the total percentages in Line 5 give the sum of the percentages in Lines 1-4, in all ennscience the additions should not have been made, and may, in good conscience, be disregarded. The reason is the writer's own fault. He admits the culpable attempt of trying to use all of the usable figures be received.

One esample will illustrate the kind of problem be faced and the atatistical depths to whicb he descended to solve it. The school systems (not individual scbools) from the Pacific Region that reported physics and chemistry bad a total enrollment of 60,575 students. Of these, 2,364 studied physics and 4,057, chemistry. The systems that reported biology, however, had a total enrollment of 2,266 students, of whom 566 were enrolled in biology. The latter constituted 24.97% of all students enrolled in the systems that reported the subject, but only 0.7% of enrollments in the systems that reported physics and cbemistry. Although 25% was undoubtedly too large for biology enrollments throughout the region, it was most certainly more nearly accurate than 0.7%. Of the rather frequent variations of this sort, the most glaring, as it happens, were in biology and general science. Since the same reasoning was followed in each case, many of the percentages for the four subjects are based on different enrollments in the same region, and consequently should not be added.

A comparison of individual regional percentages with those in 1949 indicates that some of those in 1954 are undoubtedly inaccurate. In 1955 the US percentage for physics was 4.6%; for chemistry, 7.3%; for biology, 19.6% (*Pamphlet No. 118*, 1956, Table 2). The corresponding US percentages for 1954 may be slightly inaccurate, but they fit fairly well into the general trend between 1949 and 1955. Statistics on general science were not gathered in 1955.

The writer wishes to acknowledge with gratitude help given by the staff of the College of General Studies in sending out the questionnaires for his survey and in tabulating the data from it. His special thanks go to Mrs. Carroll Quigley and Mr. Walter H. Hayes, Jr.

A comparison of Table 35 (total) with Table 34 (1949) shows a definite correlation in mathematics and science and, to a slightly less degree, in foreign languages. In mathematics WSC, ESC, and SA ranked 1, 2, and 3 respectively in Table 34. In Table 35 ESC ranked first, WSC and SA tied for second. In 1949 MA and NE ranked 5 and 6; in 1954, both were in the first five. MT, which ranked 4 in 1949, ranked 8 in 1954.

In science the order of the first four in 1949 was MA, SA, NE, and ESC; in 1954 the order was NE, MA, ESC, and SA. The order of the next two in 1949, WNC and ENC, was reversed in 1954.

In 1954 MA nosed out NE in foreign languages, although in 1949 NE led by a small margin. PAC, which came third in 1949, was next to the bottom in 1954; MT slipped from 4 to 5; ENC went from 5 to 3, and SA from 6 to 4.

Among individual subjects correlation between two corresponding tables, 32 (1949) and 35 (1954), varied considerably. In 1949 the first five regions in algebra, for example, were WSC, ESC, SA, MT, and NE; in 1954 they were ESC, WSC and SA (tied in second place), NE, MA, and WNC (tied in third). In geometry the first five in 1949 were WSC, MT, MA, ESC, and ENC; in 1954, ENC and MT were 7 and 8; SA, NE, and WNC, which were among the first six, in 1949 were

TABLE 82[1]

PERCENTAGE OF HIGH SCHOOL STUDENTS GRADES 9-12 ENROLLED IN MATHEMATICS BY GEOGRAPHICAL REGION IN CERTAIN YEARS BETWEEN 1889-90 AND 1953-54

Enrollment	NE 3	MA 2	SA 5	ESC 8	WSC 6	ENC 1	WNC 4	MT 9	PAC 7	US	LINE (1890)
Algebra	41.48	40.59	66.52	47.54	74.31	44.87	46.76	47.05	62.63	45.4	1
Geometry	18.38	21.54	26.73	16.69	33.72	20.76	21.05	19.17	39.31	21.3	2
TOT.(2)	59.79	62.08	93.23	63.37	108.01	65.66	67.74	66.15	102.22	66.7	5
Enrollment	4	2	7	6	5	1	3	9	8		(1900)
Algebra	48.68	52.67	74.51	68.92	74.51	53.76	68.65	61.74	62.13	66.3	1
Geometry	29.54	26.27	25.38	27.26	34.93	24.69	28.25	35.02	35.11	27.4	2
Trig.	1.27	2.45	3.73	4.91	4.72	1.36	1.08	3.73	2.54	1.9	3
TOT.(3)	70.39	61.27	103.52	101.03	114.11	79.66	87.76	100.44	99.76	85.6	5
Enrollment	4	2	7	6	6	1	3	9	5		(1910)
Algebra	47.79	54.96	81.01	71.93	76.02	52.17	61.14	57.25	48.76	56.9	1
Geometry	31.63	30.76	25.19	26.17	31.24	33.01	31.05	32.72	26.46	30.9	2
Trig.	1.66	2.52	2.52	3.11	2.43	1.27	1.36	2.24	2.24	1.9	3
TOT.(3)	80.78	88.16	108.62	103.13	109.61	86.37	93.44	92.15	77.39	89.7	6
Enrollment	5	2	7	8	6	1	3	9	4		(1922)
Algebra	31.49	40.94	53.11	52.02	50.63	39.35	36.46	34.28	34.87	40.2	1
Geometry	19.09	21.27	21.36	24.52	23.14	24.13	26.11	22.55	19.58	22.7	2
Trig.	1.64	2.12	1.25	1.25	1.93	0.96	0.77	1.25	3.41	1.6	3
Gen.Math.[2]	13.23	8.57	20.61	17.22	10.74	9.95	8.57	7.88	9.26	10.6	4
TOT.(4)	65.20	72.75	96.21	94.92	86.53	74.24	71.76	65.78	66.07	74.9	6

[1] For references, see Appendix B and Note 1 to Table 30. Line 3 is not needed until 1900 and Line 4 until 1922; Line 6 is not needed at all because in every year except 1948-49 all subjects in mathematics are included. In that year several subjects are listed, registrations in which equalled 0.3% of the total high school enrollment. The US percentages, except for that year and for 1953-54, are the same as those given in Chapter IV, Table 1.

[2] This term was not used until 1928. In that year and in 1933-34 separate statistics were also given for arithmetic, which alone was listed in 1922. In 1948-49 enrollments in both subjects were combined under general mathematics. In the summary table (No. 7) for 1948-

	NE	MA	SA	ESC	WSC	ENC	WNC	MT	PAC	US	LINE
Enrollment	5	1	7	8	6	2	3	9	4		(1934)
Algebra	25.4 6	27.5 6	46.5 1	46.4 2	43.1 3	28.0 5	29.8 4	27.3 7	21.6 9	30.4	1
Geometry	13.7 9	14.3 8	16.6 6	21.0 2	22.0 1	18.1 5	19.5 4	20.0 3	14.4 7	17.1	2
Trig.	1.8 2	2.0 1	0.7 8	1.1 6	1.6 3	0.9 7	0.7 8	1.2 5	1.5 4	1.3	3
Gen.Math.	0.2 3	4.7 8	19.9 1	9.1 4	10.6 2	6.3 7	6.7 6	4.6 9	7.1 5	7.4	4
TOT.(4)	50.1 7	48.5 8	83.7 1	78.5 2	77.3 3	53.3 5	56.7 4	53.1 6	44.6 9	56.2	5
Enrollment	5	1	7	8	6	2	3	9	4		(1949)
Algebra	25.8 5	24.9 6	34.0 3	36.0 2	36.3 1	22.8 8	24.8 7	26.6 4	16.0 9	28.8	1
Geometry	12.9 6	13.5 3	10.1 0	13.2 4	15.7 1	13.1 5	12.5 7	14.3 2	10.7 8	12.8	2
Trig.	2.8 2	3.3 1	1.1 7	1.1 7	1.3 6	1.9 3	1.4 5	1.7 4	1.7 4	2.0	3
Gen.Math.	11.4 8	12.0 5	18.2 1	13.7 3	12.1 4	11.2 9	11.8 6	11.5 7	16.7 2	13.1	4
TOT.(4)	52.7 6	53.9 8	63.4 3	64.0 2	65.4 1	49.0 8	50.3 7	54.1 4	48.0 9	54.7	5
Algebra	16.3 6	16.9 7	22.9 4	30.7 2	26.1 1	24.2 3	19.4 6	10.8 5	17.2 9	21.4	(1954[3]) 1
Geometry	13.0 4	13.8 3	11.7 6	10.9 7	11.8 5	15.4 1	10.4 8	13.9 2	9.6 9	12.7	2
Trig.	2.9 2	2.0 4	1.7 5	1.0 7	2.2 3	1.4 6	0.7 9	3.5 1	0.9 8	1.5	3
Gen.Math.	11.2 7	16.3 3	20.6 2	15.0 4	11.5 5	7.5 6	26.0 1	6.1 9	11.4 6	14.5	4
TOT.(4)	45.4 7	51.0 5	57.1 3	58.5 2	51.6 1	46.5 6	56.5 4	43.3 8	30.1 0	50.1	5

49, the total US enrollment in general mathematics for 1922 is given as 266,918, and the US percentage as 12.4. In BS 1020-22, II, p. 593 (Table 33), the total enrollment for arithmetic is 226,916, and the US percentage 10.5. This figure and the correct percentage were repeated in BS 1926-28, p. 1056 (Table 59). In *Bulletin 1938, No. 6*, Table I, however, the number is given as 266,916, but with the same percentage—10.5. In BS 1948-50, Ch. 5, Table 7, the new figure was apparently used as the basis for changing the percentage to 12.4.

[3] The writer's survey. As in science for 1953-54, many of the regional percentages are undoubtedly inaccurate. Since they also were based on different high school enrollments (see Note 4 to Table 31 above), the total percentages may be disregarded. Among the US percentages, algebra and trigonometry are quite certainly too low, geometry, too high; general mathematics is reasonably accurate.

TABLE 33[1]

PERCENTAGE OF HIGH SCHOOL STUDENTS GRADES 9-12 ENROLLED IN FOREIGN LANGUAGES BY GEOGRAPHICAL REGION IN CERTAIN YEARS BETWEEN 1889-90 AND 1954-55

	NE	MA	SA	ESC	WSC	ENC	WNC	MT	PAC	US	LINE
Enrollment	3	2	5	8	6	1	4	9	7		(1890)
Latin	44.8 3	28.1 8	58.0 1	54.4 2	32.9 6	33.3 5	33.5 4	16.2 9	32.1 7	35.1	1
French	22.3 1	2.2 5	13.8 2	0.7 8	6.3 3	1.8 7	1.8 8	0.0 9	2.8 4	5.8	2
German	5.8 8	13.8 2	14.9 1	11.0 4	8.2 6	11.9 3	8.9 5	3.1 9	6.2 7	10.5	3
Greek	8.6 1	2.8 4	3.4 3	1.9 6	4.4 2	1.4 7	1.0 8	0.0 9	2.6 5	3.1	4
TOT.(4)	81.5 2	46.9 6	90.1 1	68.0 3	51.8 4	48.2 5	45.2 7	19.3 9	43.7 8	54.5	6
Enrollment	4	2	7	6	5	1	3	9	8		(1900)
Latin	48.1 7	48.0 8	65.5 1	56.5 3	56.4 4	47.3 9	54.9 5	59.0 2	49.1 8	50.6	1
French	31.5 1	8.3 2	7.8 3	2.5 7	8.3 5	2.6 8	1.8 9	7.0 4	5.7 8	7.8	2
German	10.3 5	22.3 1	5.4 8	8.2 7	3.7 9	15.5 3	11.8 4	19.4 2	9.4 8	14.3	3
Greek	9.1 1	3.9 2	2.1 8	2.9 3	0.8 9	1.2 7	0.9 8	2.3 5	2.4 4	2.9	4
TOT.(4)	99.0 1	82.5 3	80.8 4	88.1 8	67.2 7	68.6 8	89.2 5	87.7 2	68.6 8	75.6	6
Enrollment	4	2	7	6	6	1	3	9	5		(1910)
Latin	38.9 8	50.3 5	73.4 1	67.0 2	60.4 3	45.4 7	51.0 4	46.7 6	36.5 9	49.0	1
French	42.0 1	12.2 2	8.2 4	5.5 5	2.9 7	2.4 8	2.2 9	3.8 8	8.0 3	9.9	2
German	18.5 5	36.3 1	7.3 9	11.9 7	7.8 8	24.7 3	20.3 4	24.9 2	18.3 6	23.7	3
Greek	2.9 1	0.7 4	1.0 2	0.9 3	0.2 7	0.3 6	0.3 6	0.3 8	0.5 6	0.7	4
Spanish	0.2 5	0.1 6	0.1 6	0.0 7	1.9 3	0.1 6	0.5 4	2.6 2	5.2 1	0.7	5
TOT.(5)	102.5 1	99.8 2	88.0 3	85.3 4	73.2 7	72.9 8	74.3 6	78.1 5	88.5 9	84.0	6
Enrollment	5	2	7	8	6	1	3	9	4		(1922)
Latin	25.3 5	31.6 3	41.8 1	35.4 2	25.2 6	28.6 4	23.8 7	17.8 8	15.2 9	27.5	1
French	38.3 1	24.6 2	18.1 3	10.3 6	5.1 9	11.6 4	6.4 7	6.3 8	10.5 6	15.5	2

[1] References, except for 1955, are found in Appendix B. Although Greek and several other languages were listed in scattered sections of the country in 1922 and later, the small number of registrants made it impractical to calculate regional percentages. In 1948-49 the addition of Italian and general language would increase the US percentage to 22.0. See Chapter V, Table 2.

	NE	MA	SA	ESC	WSC	ENC	WNC	MT	PAC	US	LINE
German	2.3 1	1.3 2	0.05 8	0.1 5	0.04 7	0.5 3	0.2 4	0.1 5	0.02 8	0.8	3
Greek	0.4 1	0.2 2	0.05 3	0.0 6	0.0 6	0.03 4	0.03 4	0.02 5	0.0 6	0.09	4
Spanish	8.9 5	16.2 4	6.0 7	5.3 8	19.7 2	6.5 6	5.0 9	17.2 3	22.9 1	11.3	5
TOT.(5)	75.2 1	73.9 2	66.0 3	51.1 4	50.0 5	47.2 7	35.4 9	41.4 8	48.8 8	55.0	6
Enrollment	5	1	7	8	6	2	3	9	4		(1934)
Latin	20.5 1	18.6 2	17.7 4	16.2 5	10.0 8	18.0 3	13.1 6	11.7 7	9.4 9	16.0	1
French	30.9 1	15.2 3	16.2 2	9.7 4	3.2 8	7.8 6	3.3 7	3.1 9	8.0 5	10.9	2
German	2.8 3	3.3 2	0.1 8	0.1 8	0.3 7	3.4 1	2.0 5	0.5 6	2.3 4	2.4	3
Spanish	4.0 5	3.5 8	4.8 4	3.7 7	17.8 1	3.9 6	2.5 0	16.4 2	18.1 3	6.2	4
TOT.(4)	58.2 1	40.6 2	38.6 3	29.7 8	31.3 7	33.1 5	20.9 9	31.7 6	35.8 4	35.5	6
Enrollment	5	1	7	8	6	2	3	9	4		(1949)
Latin	15.0 1	10.9 2	0.4 4	5.2 7	2.3 9	9.7 3	4.7 8	5.5 5	5.4 8	7.8	1
French	17.3 1	8.9 2	6.8 3	1.5 6	1.0 8	2.4 5	0.7 9	1.1 7	2.6 4	4.7	2
German	1.2 2	1.9 1	0.0 9	0.03 7	0.02 8	1.0 3	0.4 5	0.2 6	0.8 4	0.8	3
Spanish	6.8 5	11.0 3	4.9 7	3.8 8	8.4 4	6.7 6	3.7 8	14.0 2	15.7 1	8.2	4
TOT.(4)	40.3 1	32.7 2	17.9 6	10.5 8	11.7 7	19.8 5	9.5 9	20.8 4	34.3 3	21.5	5
Latin	14.1 1	11.9 2	5.6 4	3.2 7	2.3 9	8.9 3	2.4 8	4.2 6	4.8 5	6.9	(1955[2]) 1
French	17.1 1	11.6 2	6.5 3	1.1 7	0.8 8	2.4 5	0.5 9	1.4 6	3.5 4	5.8	2
German	1.3 2	2.2 1	0.01 6	0.0 7	0.04 5	0.8 3	0.4 4	0.4 4	0.8 3	0.8	3
Spanish	5.8 4	12.3 2	4.3 6	2.3 8	2.7 7	4.4 5	2.1 9	10.6 3	15.5 1	7.3	4
TOT.(4)	38.3 1	38.0 2	10.4 6	6.6 7	5.8 8	16.5 5	5.4 9	16.6 4	24.6 3	20.6	5

[2]PMLA LXX 4 2 (September 1955), 52-56. Enrollment figures in each language were collected in a national survey made by the Modern Language Association of America. In the reference cited the figures were given by states. The writer obtained the total high school enrollment figures from the Modern Language Association, grouped both sets of state figures into regions and calculated the regional percentages. Although the survey covered primarily the year 1954-55, data from a few states were not obtained for that year, and were replaced

by the most recent data available. The total enrollment in the schools covered by the survey was approximately 4,521,000. Since the different regions varied in completeness, regional enrollments are not given. Some of the regional percentages are therefore only approximate, but they are undoubtdly close to the actual situation.

TABLE 84: SUMMARY[1]

TOTAL PERCENTAGE OF HIGH SCHOOL STUDENTS GRADES 9-12 ENROLLED IN SCIENCE, MATHEMATICS, AND FOREIGN LANGUAGES BY GEOGRAPHICAL REGION IN CERTAIN YEARS BETWEEN 1889-90 AND 1954-55

	NE	MA	SA	ESC	MSC	ENC	WNC	MT	PAC	U.S.
Enrollment	3	2	5	8	0	1	4	9	7	(1890)
Science	37.05	27.48	43.62	26.69	57.41	30.37	34.78	38.44	41.83	32.9
Math.	59.79	52.08	93.23	63.37	108.01	65.56	67.74	66.15	102.22	68.7
For.Lang.	81.52	48.98	90.11	68.03	51.84	48.25	45.27	19.39	43.78	54.5
TOTAL	178.24	136.38	226.91	157.85	217.22	144.07	147.88	123.89	187.73	154.1
Enrollment	4	2	7	6	5	1	3	8	8	(1900)
Science	67.08	83.75	103.53	108.82	127.81	82.58	83.84	79.07	52.50	83.9
Math.	79.38	81.27	103.52	101.03	114.11	78.88	87.78	100.44	89.75	85.6
For.Lang.	99.01	82.53	80.84	88.18	87.27	88.68	60.25	87.72	86.68	75.6
TOTAL	245.38	247.45	287.82	279.03	309.11	228.98	240.87	267.14	228.89	245.1
Enrollment	4	2	7	8	8	1	3	9	6	(1910)
Science	55.88	92.13	97.82	91.04	98.01	88.05	75.00	74.37	54.49	81.6
Math.	80.78	88.10	108.62	103.13	109.61	86.37	93.44	92.10	77.39	89.7
FOR.Lang.	102.51	99.02	88.03	55.34	73.27	72.98	74.30	78.15	68.50	84.0
TOTAL	238.88	279.83	294.41	279.44	281.42	247.20	242.77	244.00	200.20	255.3
Enrollment	5	2	7	8	0	1	3	0	4	(1922)
Science	49.48	60.44	64.12	66.01	57.05	62.03	55.50	52.07	48.70	56.3
Math.	65.29	72.70	96.21	94.02	86.53	74.24	71.70	65.78	66.97	71.9
For.Lang.	75.21	73.92	66.03	61.14	50.05	47.27	35.49	41.48	48.60	65.0
TOTAL	189.85	207.03	226.31	212.02	194.44	184.06	162.88	159.70	164.27	189.2

Enrollment	5	1	7	8	0	2	3	9	4	(1934)
Science	52.9 5	44.9 8	60.7 1	55.3 2	50.5 7	55.1 3	54.1 4	51.8 6	44.2 9	51.4
Math.	50.1 7	48.5 8	83.7 1	78.5 2	77.3 3	53.3 5	56.7 4	53.1 8	44.0 9	58.2
For.Lang.	58.2 1	40.6 2	38.8 3	29.7 8	31.3 7	33.1 5	20.0 9	31.7 6	35.8 4	35.5
TOTAL	181.2 3	134.0 7	183.0 1	163.5 2	159.1 4	141.5 5	131.7 8	136.6 6	124.6 9	143.1
Enrollment	5	1	7	8	6	2	3	9	4	(1949)
Science	50.3 3	61.7 1	56.5 2	53.8 4	46.9 9	52.3 6	52.7 5	49.7 7	47.2 8	54.1
Math.	52.7 6	53.0 5	63.4 3	64.0 2	65.4 1	49.0 8	50.3 7	54.1 4	48.0 9	54.7
For.Lang.	40.3 1	32.7 2	17.9 8	10.5 8	11.7 7	19.8 5	9.5 9	20.8 4	24.3 3	21.5
TOTAL	149.3 1	148.3 2	137.8 3	128.3 4	124.0 6	121.1 7	112.5 0	124.8 5	110.5 8	130.3
Science	44.4 9	58.8 4	45.5 7	58.3 2	57.4 3	60.5 1	44.5 8	52.7 5	49.2 8	(1954[2]) 53.2
Math.	45.4 7	51.0 5	57.1 3	58.5 2	61.6 1	48.5 0	56.5 4	43.3 8	39.1 9	(1954[2]) 50.1
For.Lang.	38.3 1	38.0 2	18.4 6	6.6 7	5.8 8	18.5 5	5.4 9	18.8 4	24.8 3	(1955[3]) 20.8
TOTAL	128.1 2	145.8 1	119.0 6	123.4 5	124.8 4	125.5 3	108.4 9	112.6 8	112.9 7	123.9

[1] Except in 1890 and 1954, which had no entries on Line 8, the percentages for science are the sums of those in Lines 5 and 8 of Table 31. The percentages for Mathematics and Foreign Languages are the "Totals" of Tables 32 and 33, respectively. The US Totals in this table for the years 1890 through 1949 correspond to those in Tables 3, 1, and 2 of Chapter IV, which are summarized in Table 14 of Chapter V, and to Table 15 of the same chapter, respectively. The slight differences between comparable figures for the same year were caused by different bases used in making the computations, in each of which percentages were rounded off to the nearest decimal. Regional figures formed the bases in this appendix; national figures, the bases in the other tables referred to. In 1934 and 1949 a few minor subjects were not included in the tables of this appendix.

[2] From the writer's survey. See Notes 4 of Table 31 and 3 of Table 32.

[3] See Note 2 of Table 33.

9, 6, and 7 respectively. There was even less correlation in trigonometry. It is quite clear, therefore, that regional rankings based on all mathematics in high school are closer to the regional rankings in college than those in high school based on individual subjects. The same thing is true in science.

TABLE 35[1]

PERCENTAGE OF COLLEGE GRADUATES WITH MAJORS IN MATHEMATICS, PHYSICS, CHEMISTRY, BIOLOGY, AND ONE OF FOUR FOREIGN LANGUAGES, BY REGION, IN 1953-54

	Math.	Physics	Chem.	Biol.	TOT(3)	Latin	French	Spanish	German	TOT(4)
TOTAL										
NE (25319)	1.5	1.1	2.3	2.6	6.0	0.26	0.85	0.32	0.17	1.60
MA (66633)	1.5	0.8	2.5	2.4	5.7	0.31	0.63	0.52	0.15	1.61
SA (28676)	1.6	0.4	2.1	2.3	4.8	0.09	0.55	0.39	0.04	1.07
ESC(16036)	1.8	0.5	2.4	2.0	5.5	0.11	0.18	0.37	0.05	0.71
WSC(27775)	1.6	0.6	1.5	1.6	3.7	0.13	0.19	0.43	0.05	0.80
ENC(56082)	1.3	0.7	1.8	1.8	4.3	0.27	0.36	0.40	0.14	1.17
WNC(26684)	1.5	0.5	1.8	1.8	4.1	0.19	0.24	0.28	0.15	0.86
MT (11778)	1.0	0.6	1.7	1.0	3.3	0.05	0.26	0.53	0.11	0.95
PAC(27747)	0.9	0.7	1.4	1.3	3.4	0.04	0.29	0.36	0.07	0.76
US (286726)	1.4	0.7	2.0	2.0	4.7	0.20	0.43	0.41	0.11	1.15
MEN										
NE (16944)	1.5	1.5	2.5	3.0	7.0	0.24	0.24	0.12	0.13	0.73
MA (44191)	1.3	1.1	3.0	2.7	6.8	0.31	0.23	0.20	0.12	0.86
SA (16531)	1.5	0.7	2.8	2.5	0.0	0.06	0.27	0.20	0.04	0.57
ESC(10070)	2.0	0.79	3.7	3.0	7.49	0.10	0.14	0.14	0.07	0.35
WSC(17214)	1.9	0.9	2.0	1.0	4.8	0.18	0.10	0.20	0.05	0.53
ENC(36150)	1.5	0.97	2.3	1.8	5.07	0.31	0.10	0.18	0.12	0.71
WNC(17332)	1.8	0.80	2.3	2.0	5.1	0.22	0.09	0.16	0.13	0.60
MT (7941)	1.2	0.90	2.2	1.1	4.2	0.05	0.19	0.47	0.10	0.81
PAC(18061)	1.1	1.1	1.8	1.5	4.4	0.04	0.12	0.26	0.06	0.60
US (184434)	1.5	1.0	2.5	2.2	5.7	0.22	0.16	0.20	0.10	0.66
WOMEN										
NE (8375)	1.6	0.12	1.7	1.8	3.62	0.30	2.10	0.72	0.24	3.36
MA (22442)	1.8	0.12	1.4	1.8	3.32	0.29	1.40	1.10	0.20	2.99
SA (12145)	1.7	0.03	1.1	2.0	3.13	0.12	0.93	0.84	0.05	1.74
ESC(7966)	1.5	0.04	0.82	2.0	2.86	0.04	0.44	0.67	0.03	1.18
WSC(10561)	1.1	0.03	0.59	1.2	1.82	0.05	0.34	0.80	0.06	1.25
ENC(19932)	0.99	0.09	0.93	1.7	2.72	0.21	0.82	0.80	0.17	2.00
WNC(9352)	0.97	0.05	0.75	1.4	2.20	0.15	0.52	0.49	0.18	1.64
MT (3835)	0.52	0.05	0.50	0.65	1.20	0.05	0.42	0.78	0.13	1.38
PAC(9686)	0.67	0.03	0.52	0.84	1.39	0.03	0.62	0.60	0.06	1.31
US (104294)	1.3	0.07	1.0	1.6	2.67	0.17	0.92	0.79	0.13	1.84

[1] All figures are taken from *Earned Degrees*, 1953-54; total number of first-level graduates, by sex, Table 10; subject enrollments, by sex, Table 11. Figures in Table 10 were given by state; those in Table 11, by individual colleges within each state. For the exceedingly tedious task of assembling the college figures by state and combining those of each state into the nine regions, the author wishes to thank his former assistant, Mrs. Carroll Quigley. The number of graduates—men, women, and total—is based on figures from the United States. In each of the three categories, therefore, the number is slightly smaller than the corresponding totals in Table 2 of the reference. The writer formed the graduates into regions and calculated the percentages. The total percentages for the United States are the same as those in Table 3 of the reference, rounded off to the nearest decimal.

In foreign languages the correlntion is much closer in French and German than in Latin and Spanish. Again, however, the correlation hetween all languages in high school and college is closer than the correlation of individual suhjects in each.

From this hrief analysis it would seem reasonahle to conclude that the high schools' total enrollment in each of these three cumulative suhject-matter fields is a stronger factor in determining college majors in the three hroad fields than the high schools' enrollment in individual suhjects in the three fields.

It is interesting to note that in three of the regions, NE, MA, and SA in 1953-54, the proportion of majors in mathematics was larger for women than for men. This was not true in a single science or in total sciences, hut the disparity hetween men and women was progressively less in chemistry and hiology than in physics. In Latin the proportion of women was greater than that of men in all regions except in MA, ESC, ENC, WNC, and PAC. in MT it was the same for hoth. In French and Spanish the proportion of women was greater in each region, and in German, except in ESC and PAC. In all languages the percentage of women was far greater than that of men in each region.

In view of the teacher shortages in the cumulative suhjects, it would he interesting to see if there is any correlation hetween such shortages and the regional rankings in these suhjects. Comparahle data on teachers unfortunately could not he ohtained.

[1] This statement is based on the percentages in *Pamphlet No. 118*, 1956, Table 4. New England was a close second, with ESC and SA third and fourth, respectively. Table 13 of this reference shows that WSC is still in the lead in mathematics, with ESC, SA, and MA next in that sequence.

[2] The ranking in 1955 (Fall of 1954) was based on enrollment of students expressed as the percentsge of students in the grade in which the course is usually offered. This may account for the increase in the number of exceptions.

APPENDIX G

DISTRIBUTION OF HIGH SCHOOL STUDENTS

Changes in the distribution of high school students involve several different factors. Among them are three of primary importance: increase of enrollments, progression from one grade to the next, and drop-out rates. Although the effects produced by each of the three cannot be separated, their results are plainly evident in Table 36.

TABLE 36

DISTRIBUTION OF STUDENTS BY GRADE IN PUBLIC HIGH SCHOOLS IN NUMBERS AND PERCENTAGES OF THE TOTAL HIGH SCHOOL ENROLLMENT IN CERTAIN YEARS BETWEEN 1889-90 and 1954-55

	1890[1]	1900[1]	1910[2]	1922[3]	1934[4]	1949[5]	1955[6]
Totals in 1000's	203	519	915	2230	5621	5399	6584
Grade 9 in 1000's	87	223	393	869	1827	1641	1998
" 9 percentage	43.0	43.0	42.9	39.0	32.5	30.4	30.3
" 10 in 1000's	53	135	248	608	1540	1491	1782
" 10 percentage	26.0	26.0	27.1	27.3	27.4	27.8	27.1
Percentage 9 minus 10	17.0	17.0	15.8	11.7	5.1	2.8	3.2
Grade 11 in 1000's	37	93	163	427	1231	1242	1500
" 11 percentage	18.0	18.0	17.8	19.1	21.9	22.9	22.8
Percentage 10 minus 11	8.0	8.0	9.3	8.2	5.5	4.7	4.3
Grade 12 in 1000's	26	68	111	326	1023	1026	1304
" 12 percentage	13.0	13.0	12.2	14.6	18.2	10.1	19.8
Percentage 11 minus 12	5.0	5.0	5.6	4.5	3.7	3.0	3.0
TOTAL PERCENTAGE	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[1] In CR 1904-05, II, p. 822, the grade percentages for that year were calculated on the basis of grade enrollments in the high schools of a number of cities. This was the first instance found of such calculations. The writer applied these percentages to the total high school enrollment given in CR 1889-90, II, p. 1388, and in CR 1899-1000, II, p. 2129, for the grade enrollments shown in this table.

[2] CR 1909-10, II, p. 1130. These figures and percentages were based on reports from 10,213 public high schools. Subject enrollments and their percentage of the total high school enrollment, however, were based on reports from 8,097 high schools with a total enrollment

of 739,143—or 80.7% of the real total (pp. 1174-84).

[3] BS 1920-22, II, pp. 534-35. These figures and percentages were based on reports from 14,056 public high schools. Subject enrollments and their percentage of the total high school enrollment were based on reports from 13,700 schools with a total enrollment of 2,155,460—or 96.8% of the total (pp. 580-601).

[4] *Bulletin 1938, No.* 6, p. 9, Note 3, gives enrollments as follows: grade 9—1,461,367; grade 10—1,232,045; grade 11—984,737; grade 12—818,365; total—4,498,514, from 17,632 public high schools (p. 32). The reference also states that this was "nearly 80% of the total number of pupils attending high school." On the basis of this statement, corroborated in BS 1948-50, Ch. 5, pp. 5 and 27, this total enrollment was corrected for 80%, as given in the table. It was assumed that the grade distribution would be the same for the larger as for the smaller figure.

In BS 1932-34, Ch. 2, Table 2, enrollments reported by state systems were as follows: grade 9—1,855,026; grade 10—1,540,254; grade 11—1,209,180; grade 12—1,005,375; total—5,639,835. In Ch. 5, Table 1, the number reported in 23,614 high schools was 5,340,563. Distribution by grades was not given in this table, but in Table E, as follows: grade 9—1,702,817; grade 10—1,435,636; grade 11—1,150,868; grade 12—958,011; total—5,245,322, from 17,975 schools (p. 11). The grade percentages were exactly the same as those worked out for the enrollments given above from p. 9, which are used in this table.

[5] BS 1948-50, Ch. 5, p. 6, Note 3. Percentages were calculated by the writer.

[6] Grade percentages were calculated by the writer from grade enrollments estimated by Foster and Hobson in *School Life* (May 1955). See Note 11 below.

This table provides several interesting contrasts. As the figures for grade 9 increase, its percentage of the total enrollment decreases. As the figures for grades 11 and 12 increase, their percentages also increase. The figures for grade 10 increase, but its percentage remains remarkably constant.

The differences between the percentages of two consecutive grades go in a descending scale, which accelerates rapidly for grades 9 and 10 after 1922. After 1922 also, the differences between grades 10 and 11 are greater than those between grades 9 and 10. This would seem to suggest that the period for the largest percentage of drop-outs had changed from the period between grades 9-10 to that between grades 10-11. The broken sequence for some of the percentages between 1934 and 1955 is somewhat puzzling. When actual enrollments for 1954-55 become available, the numbers and therefore the percentages for that year may have slight changes, that will bring them more in line.[1]

In 1889-90, as the table shows, there were approximately 26,000 students in grade 12. Of these about 22,000 graduated.[2] Those in grade 12 presumably entered high school in the fall of 1886, when enrollments in grade 9 were approximately 34,090.[3] Four years later 76% of these had "survived" to grade 12 and approximately 65% to graduation. Approximately 85% of the seniors graduated.

These figures, by tracing the progress of students from grade 9 through grade 12, show the effects of promotion, failure, and drop-outs, in a way that could not be done in Table 36. The table below gives

additional statistics of this kind for thirteen four-year periods or quadrennia between 1890 and 1958.

TABLE 37[1]

CONTINUATION RATES OF PUBLIC HIGH SCHOOL STUDENTS FROM GRADE 9 THROUGH 12 IN CERTAIN FOUR-YEAR PERIODS BETWEEN 1889-90 AND 1957-58

	GRADE 9	GRADE 10	COL. 1	GRADE 11	COL. 1	COL. 2	GRADE 12	COL. 1	COL. 2	COL. 3
1889-90 to 1892-93[2]	87	55	63.2	43	78.2	49.4	33	70.7	37.9	89.1
1896-97 to 1899-00[3]	176	117	66.5	86	73.5	48.9	68	79.1	38.1	90.8
1906-07 to 1909-10[4]	289	209	72.3	150	71.8	51.9	111	74.6	38.7	99.9
1918-19 to 1921-22[5]	865	499	75.0	387	77.6	58.2	326	84.2	49.0	87.4
1930-31 to 1933-34[6]	1702	1387	81.5	1138	82.0	66.8	1005	88.3	59.0	80.2
1938-39 to 1941-42[7]	1995	1767	88.6	1517	85.8	76.0	1273	84.0	64.0	91.2
1946-49 to 1951-52[8]	1709	1512	88.5	1313	86.8	76.8	1111	84.6	65.0	95.3
1949-50 to 1952-53[9]	1756	1548	88.1	1338	86.4	76.2	1132	84.8	64.5	93.6[15]
1950-51 to 1953-54[10]	1781	1582	89.0	1373	86.8	77.1	1190	86.6	66.8	94.7[15]
1951-52 to 1954-55[11]	1820	1655	90.9	1412	85.3	77.6	1240	87.6	68.1	95.0[15]
1952-53 to 1955-56[12]	1685	1717	91.1	1473	85.9	79.4	1300	88.1	68.9	95.0[15]
1953-54 to 1956-57[13]	1944	1776	91.3	1534	88.4	78.3	1353	88.2	69.8	95.0[15]
1954-55 to 1957-58[14]	1978	1810	91.5	1575	87.0	79.8	1390	86.3	70.2	96.0[15]

[1] Grade 10 is the second year in each quadrennium, grade 11, the third year, grade 12, the fourth. Column 1 gives the percentage of a given grade in terms of the one immediately preceding; column 2 gives the percentage in each case in terms of grade 9. Column 3 gives the percentage of students in grade 12 who graduated. All grade enrollments are given in thousands rounded off to the nearest whole number; all percentages are rounded off to the nearest decimal. In the quadrennia ending in 1941-42 and after, certain figures are underscored to indicate that they were based on reports of actual enrollments. The other figures after that date are estimated in the manner indicated in appropriate notes below. Before that date, the figures are actual unless otherwise indicated.

[2] For this quadrennium and the next only total enrollments were available in each year. Enrollments were estimated for each grade in each of the eight years with the grade percentages used in Table 38 (Note 1) for 1890. For enrollments in years other than 1889-90, see CR 1893-94, I, p. 37. For the number of graduates in 1893, see CR 1892-93, I, p. 55.

[3] For enrollments, see CR 1899-1900, II, p. 2120; for graduates, p. 2130.

[4] BS 1920-22, II, Ch. VI, Table 2 contains enrollments by grade for each year between 1906-07 and 1915-16, and for 1917-18, 1919-20, and 1921-22. For grade and total enrollments and graduates in 1909-10, see CR 1909-10, II, pp. 1130, 1142-43.

[5] Enrollments in grade 9 for 1918-19, and in grade 11 for 1920-21 were estimated by comparing the enrollments in the corresponding grades in the year immediately preceding and following, and by noting the trend of the percentages in column 1. Enrollments in grades 10 and 12 were given in the first reference in Note 4. For graduates in 1921-22, see *Ibid.*, Tables 1 and 22.

[6] BS 1932-34, Ch. 2, Table 2, p. 48, contains enrollments by grade for each year between 1922-23 and 1933-34. Those for the years ending in even numbers, i.e. 1923-24, were based on biennial surveys; those for the other years were officially estimated from trends indicated by the surveys. All enrollments came from reports made by state rather than individual school systems. This was true also for the next two quadrennia. For graduates in 1933-34,

see *Ibid.*, Ch. 5, Table 41. The gradnates were reported by individual school systems, and the percentage was based on enrollments in grade 12 (Table E, p. 9 of reference) reported by those schools. It was derived in the same way, therefore, as those for the preceding years listed.

[7] BS 1949-50, Ch. 1, Table 14. See comment on enrollments by grade in Note 9. The percentage of graduates in grade 12 was calculated from data in Table 9 of reference. This table gives the percentage of students in grade 5 who graduated seven years later, for each septennium between 1930-31 and 1942-43 and ending consecutively between 1937-39 and 1949-50. Although the figures were based on data from public and nonpublic schools—this was also true of the percentage of graduates in column 3—comparable percentages worked out by this writer were 98.5 for grade 10, column 1, 99.8 and 76.0 for grade 11, columns 1 and 2, and 93.9 and 63.9 for grade 12, columns 1 and 2. Table 17 of the reference contains a study similar to the one in Table 6, for high school grades only during the same period. Its figures verify the percentages calculated from Table 9.

[8] BS 1950-52, Ch. 1, Table 12. The enrollments by grade were based on reports by state systems or estimated from them (Note 6). Tables 6 and 14 correspond to Tables 9 and 17 in Note 7, and add two septennia and quadrennia respectively. Comparable percentages worked out by this writer also bore out the percentages in the various columns in the way indicated in Note 7.

[9] BS 1950-52, Ch. 1, Table 12, for enrollments in grades 9 to 11. The enrollment in grade 12 was estimated by Foster and Hobson (*School Life*, May 1955, p. 126) as 1,202,000. This figure yielded 89.8% for column 1 and 68.4% for column 2. Both of these seemed to vary too much from the patterns of the preceding years. Since the figures for grades 9 and 11 were actual, the estimate for grade 12 was apparently too high. A comparison of the estimates for 1953-54 (Table 12 of the reference) with the actual enrollments for that year, reported in *School Life* (May 1956, pp. 8-9), shows the following:

Grade		1952-53	1953-54	1953-54 Cor.	1954-55	1955-59
9	(1000's)	1903	1964	1944—20	1998	2078
10	"	1691	1722	1717— 5	1782	1815
11	"	1401	1439	1412—27	1500	1559
12	"	1202	1294	1190—74	1304	1364

The fifth column figures appear in reverse order of grades in Table 37, beginning with the quadrennium ending in 1953-54. The grade corrections for 1953-54 were applied, with some variations, to the estimated grade enrollments in the years between 1949-50 and 1957-59 (Table 07). The percentage patterns in columns 1, 2, and 3 were used as a guide in making the corrections.

[10] *School Life* (May 1955), p. 126, for enrollments in grades 9 through 11. *Ibid.* (May 1956), p. 9, for enrollment in grade 12. The enrollment in grade 11 was corrected as indicated in Note 9.

[11] Enrollments in grades 9, 10, and 12 from *School Life* (May 1955), p. 126, with grades 10 and 12 corrected as indicated in Note 9. Enrollment in Grade 11 from *School Life* (May 1956), p. 9.

[12] Enrollments in grades 9, 11, and 12 from first reference in Note 11, corrected as indicated in Note 9. Enrollment in grade 10 from second reference in Note 11.

[13] Enrollment in grade 9 from *School Life* (May 1956), p. 9. Other enrollments, *Ibid.* (May 1955), corrected as indicated in Note 9.

[14] All enrollments from *School Life* (May 1955), p. 126, corrected, with some variations, as indicated in Note 9.

[15] See text below for discussion of percentages in column 3.

Although many of the figures in this table after 1933-34 are based on comparative estimates, the resulting percentages in columns 1 and 2 form n reasonable pattern. If it may be nssumed, in the absence of n more nuthentic guide, that they are approximately correct, continuavnriations nre most likely caused by erroneous estimates, and show up most plninly in the progression from grade 10 to 11. It is noticenble

that between 1890 and 1934 a smaller proportion of students went from grade 9 to 10 than from 10 to 11, except in the quadrennium ending in 1910. During this period, except in the first quadrennium, the proportion going from grade 11 to 12 was larger than either of the other two progression rates. After 1933-34 the continuation rates from grade 9 to 10 were consistently larger than those of the other two. Between that date and 1953-54 the continuation from grade 10 to 11 was proportionately larger than the progression from grade 11 to 12. During this period the trend from 10 to 11 was slightly up, the trend from 11 to 12 was slightly down, but after a leveling off it had begun to climb by 1953-54. The war and the draft clearly affected the age group in grade 11. Since 1953-54 the continuation rates for grades 9 and 11 have slowly risen. The rate from grade 10 to 11 declined slightly between 1954 and 1955. The rate since then has been up, and in the current year it has inched ahead of its 1953-54 level. Although the period between grades 10 and 11 has clearly become the most critical in the high school years, since 1900 the differences among the continuation rates have had a somewhat remarkable uniformity. At the present time it is possible to say with some assurance that about 90% of the students will continue from grade 9 to grade 10. Of these about 85% will continue into grade 11, and of these about 88%, into grade 12. Of those who begin in grade 9, approximately 70% will enter grade 12 and about 65% will graduate.[6]

The proportion of students in grade 12 who graduate fluctuated considerably in the six quadrennia listed between 1889-90 and 1941-42 (T. 37, Col. 3 for grade 12). In the first two quadrennia the percentages may be somewhat low because enrollments in grade 12 could only be estimated. This may help to explain the decided contrast with an unusual situation in 1909-10 when grade 12 and the graduating class were all but identical—the first and only instance of the kind in high school history. As the table shows, there was a rapid falling off by 1921-22[6] which continued on into the low point of the entire 68-year period, during the depression in 1933-34. But by 1941-42 the reverse and upward trend was well under way, and since 1951-52 more than nine out of ten seniors stay on each year to graduate.

When actual figures of public high school graduates were last published, for the year 1953-54, they numbered 1,129,000—94.7% of grade 12, and 63.4% of students who entered grade 9 in 1950-51. They also constituted 88.5% of all public and nonpublic high school graduates in 1953-54. Table 38 puts these and comparable figures into historical perspective and supplementing Tables 36 and 37.

TABLE 38[1]

A COMPARISON BETWEEN THE NUMBER OF GRADUATES IN PUBLIC AND NONPUBLIC HIGH SCHOOLS IN CERTAIN YEARS BETWEEN 1889-90 AND 1957-58

	Public	%9	Nonpublic	Total	Public H.S. % of Total
1889-90	21,882	64.1	21,849	43,731	50.4
1899-1900	81,737	35.1	33,148	94,883	65.1
1909-10	111,363	38.5	45,068	158,429	71.2
1921-22	284,874[2]	42.8	72,326	357,000[3]	79.7
1933-34	806,510[2]	47.4	108,343	914,853[3]	88.2
1937-38	1,030,216	53.8	89,863	1,120,079[3]	91.9
1945-46	1,011,173	53.2	68,860	1,080,033[4]	93.8
1950-51	1,045,633	82.5	136,267	1,181,800[5]	88.5
1951-52	1,058,900[6]	61.9	137,800	1,196,500[7]	88.5
1952-53	1,060,500[6]	60.4	137,800	1,198,300[5]	88.5
1953-54	1,129,341[8]	83.4	146,759	1,278,100[7]	88.5
1954-55	1,178,000[6]	64.7	156,000	1,334,000[9]	88.3
1955-56	1,235,000[6]	64.4	166,000	1,401,000[9]	88.2
1956-57	1,286,000[6]	66.1	175,000	1,461,000[9]	88.2
1957-58	1,340,000[6]	67.7	186,000	1,526,000[9]	87.8

[1] Through 1950-51 public high school graduates, except as indicated, are conveniently listed in BS 1950-52, Ch. 5, Table A; total high school graduates, in Ch. 1, Table 15. Figures in second column give percentage of grade 9 who graduated. For enrollments in grade 9 in certain corresponding years, see Table 37.

[2] See Appendix B.

[3] *Bulletin, 1940, No. 2*, Ch. 1, Table 15.

[4] BS 1952-54, Ch. 1, Table 15.

[5] Calculated from figures in total column as explained in text.

[6] BS 1952-54, Ch. 4, Sect. 1, Table XXIV.

[7] BS 1952-54, Ch. 1, Table 15.

[8] BS 1952-54, Ch. 2, Table 13.

[9] From "Number of High-School Graduates From Public and Nonpublic Schools, 1939-40 to 1953-54 and Forecasts to 1960-70." This is a single, mimeographed sheet with data "As of September 21, 1956," kindly furnished to the writer by the Office of Education. A revision of these estimates was made in February 1957 and still another revision will be presented in a forthcoming publication.

In each of the fifteen years listed in this table there are two basic figures: those for the graduates of public high schools and those for the total graduates of public and nonpublic types.[7] Between 1889-90 and 1950-51 and in 1953-54 the three sets of figures and the percentages in the last column are scarcely open to doubt. In each of the last two years just mentioned public high school graduates constituted 88.5% of the total. The same percentage was therefore assumed for the two intervening years.

The pattern thus created shows that graduates from public high schools increased steadily between 1889-90 and 1957-58, except for a slight setback in 1945-46. The proportion of such graduates, after the equilibrium of 1889-90, reached its highest point in 1945-46, and since that year has hovered around 88%.

Graduates from nonpublic high schools form a much less regular pattern. Although actual figures increased steadily through 1933-34, the more rapid rate of increase in public schools caused a steady decrease in the proportion of nonpublic graduates. The effects of the Depression and of World War II, as might have been expected, were much more pronounced on schools of the nonpublic type. Between 1933-34 and 1937-38, while the nonpublic graduates decreased about 14%, those in public schools increased about 27%—their lowest rate up to that point. In the next period, ending with 1945-46, the public schools lost only a little less than 2%, but the nonpublic, a little more than 23%.

Since 1953-54, on the basis of figures given in Table 38, graduates from nonpublic schools have increased at a more rapid rate than those from public schools. This had happened once before—between 1945-46 and 1950-51—and with such propulsion that the same fundamental causes seem to have remained in operation. One was the general prosperity which enabled more parents to afford private education for their children; another was undoubtedly the growing and increasingly evident dissatisfaction with public high school education.

In this connection it should be made plain that the figures from 1954-55 through 1957-58 are derived from calculations by the writer (see Note 9 of Table 38). These assumptions guided the calculations: 1) about 95% of grade 12 in public high schools have graduated each year since 1953-54 (Col. 3, Table 37 and Col. 1 of Table 38); 2) there is a close relationship in the corresponding years between the percentage of students who continue from grade 9 into grade 12 and the percentage who continue from grade 9 to graduation (Table 37, Col. 2 of grade 12, and Col. 2 of Table 38); 3) the number of public school students in grade 12 (Table 37) is not far above or below 19.2% of the total in grades 9-12; and 4) public high school graduates constitute approximately 88% of total secondary school graduates.

Any one of these four assumptions might be used as a starting point from which appropriate calculations could be made, provided a certain figure is given—or assumed. For example, if there are 1,000,000 graduates in public and nonpublic high schools in a given year, about 880,000 of these would be from the public high schools. This figure would be about 95% of the students in grade 12 of the public high schools, about 18% of the students in grades 9-12,* and about 67% of those who entered grade 9 four years earlier. The figure for grade 12

would be about 19% of the total high school enrollment and about 70% of those who entered grade 9.

A starting point could also be made of course with figures, given or assumed, for any of the grades nine through 12. The latest study shows for example, that 67% of grade 0 students enroll in general science. In the fall of 1957, out of an assumed enrollment of 2,300,000 students about 1,540,000 would be studying general science. In the fall of 1958, about 91% of grade 9 would continue into grade 10 (Table 37). Of these, according to the latest study, about 74% or 1,549,000 would study biology. In the fall of 1959, about 87% of grade 10 would continue into grade 11 (Table 37). Of these, about 34.4% or 626,000 would study chemistry.

In the fall of 1960, about 88% of grade 11 would go into grade 12 (Table 37). Of these, about 24.5% or 388,000 would study physics.[9] Of the 1,584,000 who entered grade 12, about 95% or 1,505,000 would graduate. These would constitute about 88% of all secondary school graduates (Table 38), a total of about 1,730,000. The public school graduates would also total about 18% of the total public school enrollment in grades 9-12—approximately 8,355,000. Of these about 31% would be in grade 9, 27.5% in grade 10, 22.5% in grade 11, and 10% in grade 12.[10]

From these grade percentages and from continuation and subject percentages used above, it would be easy to estimate the number of high school students in each of the four sciences in 1960-61 and in the three years following. By that time, and probably sooner, many of the percentages would have changed and new formulae would have to be worked out. Because of the numbers involved the change of only a few percentage points would make a tremendous difference in grade and subject enrollments.

An example of this can be seen in Tables 36 and 37. A comparison of the two shows discrepancies in the enrollments of certain grades in the same year: grade 12 in 1933-34 and in 1954-55; grade 9 in 1948-49, and grades 10 and 11 in 1954-55 (Table 37, quadrennia 5, 10, 7, 12, and 11 respectively).

As indicated previously (Note 6 of Table 37), after 1933-34 all figures in Table 37, except those underscored, are taken from or based on official estimates of enrollments in state systems. Although the 1949 figure for grade 9 in Table 36, based on enrollments reported by individual schools, could have been used in Table 37, it would not have fit in with other figures in quadrennium 7, which were based on state reports. The same reason prevented use of the grade 12 figure for 1933-34 (Table 36) in quadrennium 5.

When estimates for each of the four grades in 1953-54 were corrected by actual enrollment figures, it seemed appropriate to make comparable corrections for the grade enrollments of 1954-55 and 1955-56. In the first of these two years the corrections, including those for grade 9 (Table 37, quadrennium 13), totaled 113,000, as compared with 125,000 in 1953-54 and 93,000 in 1955-56, exclusive of grade 9 (compare figures for these years in Table 37 with those in Note 9 of that table). It is obvious that the reduction of grade enrollments would decrease subject enrollments in those grades. A comparison is made only of the changes that would have occurred in 1954-55.[11]

Tables 36, 37, and 38, then, illustrate better than words the staggering growth of the public high schools during the last sixty-eight years. Despite the fluctuations caused by war, depression, and the staccato spread of educational opportunities among minority groups, the long-range trend of continuation rates has been steadily up. Although nearly a third of grade 9 students still fail to graduate, it seems likely that public awareness will cause a general decrease of this unprofitable proportion. From this group alone may come several hundred thousand additional graduates each year. If only half of these enter college, by 1970-71 the number of students in college will almost equal the number in high school during the current year.[12]

[1] This happened when the estimates for 1953-54 (see reference in Note 6 of Table 36) were checked against actual enrollments for that year in *School Life* (May 1956). The estimated enrollments were 125,000 larger, and the shift in grade enrollments caused a shift in percentages: an increase in grades 9 and 10, but a decrease in grade 12. The percentage for grade 11 was the same. See also Note 9 of Table 37.

[2] BS 1920-22, II, Ch. 6, Table 1, and BS 1950-52, Ch. 5, Table A.

[3] For the total high school enrollment that year, see CR 1893-94, 1, p. 37. Grade 9 was estimated as 43% of that total (Note 1 of Table 36).

[4] The writer prefers this term because it emphasizes what the students do. The more usual term, "retention rates," seems to emphasize what the schools do, and has the connotation of "holding back."

[5] In 1952 the proportion, based on data from public and nonpublic schools, was 61.0%. In 1950 it was 62.5 and in 1951, 62.3. See BS 1950-52, Ch. 1, Table 14. The comparable percentage in 1953-54 was 63.4 (BS 1952-54, Ch. 1, Table 14).

[6] The intervening stage is shown in CR 1915-16 (for 1914-15), II, pp. 448 and 454, with 94.7%.

[7] These include private academies, secondary or preparatory schools operated by public and private institutions, and schools for exceptional children. See BS 1952-54, Ch. 1, Table 13.

[8] In 1950-51 this percentage for public and nonpublic schools was 18.4; in 1946, 18.8%; in 1938, 17.5%; in 1930, 14.3; in 1926, 12.5. Those calculated by the writer for the public high schools alone were slightly lower in each of these years.

[9] These percentages are taken from *Pamphlet No. 120*, 1956, Table 7. Comparable percentages for mathematics are found in Tables 17 and 18 of reference: general mathematics, 43.1% and elementary algebra, 67% (both subjects in grade 9); plane geometry, 41.6% (grade 10); intermediate algebra, 32.2% (grade 11); plane trigonometry, 9.2% and solid geometry, 7.6% (both subjects in grade 12). These last two percentages are for the first semester only; for both semesters they would be approximately 16% and 13% respectively.

[10] The total enrollment figure is in line with the projection made by Foster and Hobson (*School Life*, May 1955). Their estimate for 1959-60 is 8,182,000. The grade percentages will differ slightly from those given in the text above.

[11] Although these revised grade enrollments and percentages were not substituted for those that appear in Table 36, which are official estimates, it is believed that the revised figures are more nearly accurate. If they are substituted for the grade enrollment figures for 1955 in Chapter VI, Table 19, the following changes would occur in that table and in the 1955 column of Table 18 in the same chapter:

	Grade 9	T. 19	T. 18		Grade 10	T. 19	T. 18
	1978	20.5			1776	19.1	
Alg. 1	1193	14.5	60.3	P. Geom.	662	10.5	37.3
Gen. Math.	793	11.2	41.1	Biol.	1289	29.5	72.6
Gen. Sci.	1444	28.7	73.0				
	Grade 11				Grade 12		
	1473	18.5			1240	20.8	
Alg. 2	420	3.9	28.5	Trig.	161	47.6	13.0
Chem.	474	15.1	32.2	S. Geom.	141	50.0	11.3
				Physics	288	—1.4	23.2

Every percentage in Table 19 changed; in Table 18, only those for general mathematics and solid geometry. All percentages are *plus*, except for physics in Table 19. Enrollments are given to the nearest thousand. Comparable changes in Table 20 of Chapter VI were not made. All the subject-enrollment figures would be smaller, and the grade percentages in foreign languages would be reduced approximately as follows: Grade 9—3.0%; grade 10—2.2; grade 11—0.3; grade 12—0.1. Grade percentages in English would change very little.

[12] "Projections of Regular Session Enrollment in Institutions of Higher Education in Continental United States: 1954-55 to 1970-71 (Projections as of March 1956)." A mimeographed sheet furnished to the writer by the Office of Education. A companion piece to this, dealing with first-time enrollments, predicted 727,000 such students for the fall of 1950. The estimated actual number was 735,065 (*School and Society*, December 8, 1950, p. 201). The estimate was based on the 37th annual survey conducted by Raymond Walters and published in the issue of the reference cited.

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*Prepared with the assistance of John Hill Monroe.